bp

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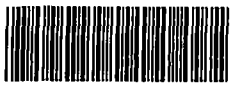

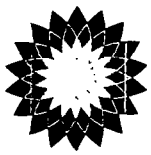

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May 25, 2006

VIA OVERNIGHT MAIL

Ms. Carlyn Winter Prisk
3HS11
U.S. Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, PA 19103-2029

RE: **Lower Darby Creek Area Superfund Site**
Supplemental Response to CERCLA Section 104(e) Request

Dear Ms. Prisk:

This letter constitutes Atlantic Richfield Company's ("Atlantic Richfield") supplemental response ("Supplemental Response") to the United States Environmental Protection Agency's ("EPA") letter and 104(e) request for information dated February 19, 2002 and follow-up 104(e) request for information dated August 9, 2005 (collectively "RFI"), which seek information regarding the Lower Darby Creek Area Superfund Site ("Site").

Atlantic Richfield submits this Supplemental Response to the RFI in good faith and reserves all rights to dispute any and all claims made by the EPA, with no stated or implied waiver of any of Atlantic Richfield's rights, remedies or defenses in this matter. Atlantic Richfield reserves its right to challenge EPA's authority to request information in this manner in general and will reserve its objections as stated below. This Supplemental Response does not constitute, and should not be construed as, an admission of liability by Atlantic Richfield for any of the claims, demands, causes of action, releases or violations set forth in the RFI.

General Objections

Atlantic Richfield objects generally to the overbroad, vague and unduly burdensome requests for documents and information. Atlantic Richfield further objects to the RFI as overbroad and unduly burdensome in that it seeks documents and information that pertain to a time period of more than 26 to 44 years ago, for a facility that Atlantic Richfield has not owned for more than 20 years.

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Atlantic Richfield objects to the RFI to the extent that it seeks information beyond the scope of the statutory authorities cited or is protected by the attorney-client privilege, the attorney work product doctrine, or any other privilege. Atlantic Richfield also objects to the RFI as overbroad and unduly burdensome insofar as it seeks copies of documents that are in the public domain, including documents in the files of any branch of the U.S. government, state government, or any local government.

Specific Objections

Atlantic Richfield objects to EPA's overly broad and vague reference to "locations owned or operated by Atlantic Richfield Company," "establishment(s)" and "arrangement." Atlantic Richfield further objects to the overly broad and vague reference to "facilities in the Philadelphia, Pennsylvania area." To respond to the questions utilizing these references would be prohibitively time consuming and would involve enormous quantities of information which bear no relevance to the RFI. Therefore, Atlantic Richfield is limiting its response to the Fort Mifflin Terminal, which is the only Atlantic Richfield facility that EPA has alleged transported to or disposed of wastes at the Site.

Atlantic Richfield objects to the vague and ambiguous definition of "arrangement" in the RFI.

Notwithstanding the above general and specific objections, Atlantic Richfield has made a good faith effort to locate all responsive documents and information, within its possession, custody and control that address matters related to the Lower Darby Creek Area Superfund Site. This Supplemental Response represents Atlantic Richfield's understanding of the inquiry as of this date. Atlantic Richfield reserves the right to further supplement this response should additional information become available in the future. Subject to the foregoing general and specific objections, Atlantic Richfield responds as follows.

Response to Request

1. *State the name of your company, its mailing address, and telephone number. Further identify:*

   a. *The dates and states of incorporation of your company;*

   b. *The date and original state of incorporation of your company; and*

   c. *The parent corporation of your company, if any, and all subsidiaries or other affiliated entities.*

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Response to Question No. 1

Subject to the general and specific objections above, and without waiver of these objections, Atlantic Richfield responds as follows.

Atlantic Richfield Company; Principal Operating Office located at 28100 Torch Parkway, Warrenville, Illinois 60555. Please direct all correspondence and contacts to Atlantic Richfield Company c/o Charles R. Pinzone, Jr., BP Legal, 4101 Winfield Road, Warrenville, Illinois 60555.

a. March 14, 1985, Delaware.
b. On April 29, 1870, the Atlantic Refining Company was incorporated under the laws of the State of Pennsylvania. On January 3, 1966, Richfield Oil Corporation, incorporated in Delaware on November 14, 1936, merged into Atlantic Refining Company. On May 3, 1966, the Atlantic Refining Company changed its name to Atlantic Richfield Company. On May 7, 1985, Atlantic Richfield Company, a Pennsylvania corporation, merged into Atlantic Richfield Delaware Corporation, incorporated in Delaware on March 14, 1985, and Atlantic Richfield Delaware Corporation changed its name to Atlantic Richfield Company.
c. BP America Inc. See also, Response 1(b) above. Various other companies and operations have been added to or divested from Atlantic Richfield and its predecessors.

2. *What is the current nature of the business or activity conducted at your establishment(s) in the Philadelphia, Pennsylvania area? What was the nature of your business or activity between 1958 and 1976? Please describe in detail. If the nature of your business or activity changed from the period of 1958 to 1976 to the present, please provide a detailed explanation of the changes to date.*

Response to Question No. 2

Subject to the general and specific objections above, and without waiver of these objections, and upon information and belief, Atlantic Richfield responds as follows.

In its initial response Atlantic Richfield responded that it had owned and operated its Philadelphia Refinery, located at 3144 Passyunk Avenue, Philadelphia, PA, between 1958 and 1976. In September, 1985, Atlantic Richfield sold its Philadelphia Refinery to Atlantic Petroleum Corporation. In 1988, Sun Company, Inc. acquired Atlantic Petroleum Corporation, and Atlantic Refining and Marketing Company. Sun owned Atlantic Richfield's former Philadelphia Refinery (now known as Point Breeze Processing Area) through its subsidiary, Atlantic Refining and Marketing, and operated it through its subsidiary, Sun Company, Inc.,

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Refining and Marketing. In addition, Atlantic Richfield and its affiliated entities owned, operated and/or had contractual relationships with owners or operators of retail gasoline service stations and terminal distribution facilities in Pennsylvania, New Jersey and Delaware during the relevant time period.

Included in the September 1985 sale to Atlantic Pretroleum Corporation was Atlantic Richfield's Fort Mifflin Terminal (the "Terminal" or "Fort Mifflin"). In 1959, Atlantic Refining Company conveyed the Terminal property to Atlantic Pipe Line Company, which merged into ARCO Pipeline Company in 1970. ARCO Pipeline Company, a subsidiary of Atlantic Richfield, owned and operated the Terminal until its sale in September 1985. The Terminal, located on the Delaware River in Tinicum Township, Delaware County, Pennsylvania, consisted of 2 berths, six crude tanks, two bunker oil tanks, three light product boilers, and two administration buildings. The Terminal property was acquired to handle larger tankers which discharged crude for Atlantic Richfield's former Philadelphia Refinery. Almost all of the crude for the Refinery was received by vessel at the two berths. In addition to crude, light products were received to supplement the product received from the Philadelphia Refinery for the Eastern Region of the United States.

3. *Identify all persons currently or formerly employed by your establishment(s) who have or may have personal knowledge of your operations and waste disposal practices between 1958 and 1976 at your facilities in the Philadelphia, Pennsylvania area. For each such person, state that person's employer, job title, dates of employment, current address, and telephone number. If the current telephone number or address is not available, provide the last known telephone number or last known address of such person.*

Response to Question No. 3

In addition to the general and specific objections given above, Atlantic Richfield further objects to this Question as unduly burdensome, oppressive and vague regarding the nature of the Atlantic Richfield's employees and the employees' knowledge of relevant matters. Atlantic Richfield does not compile nor maintain lists of past or present employees in any such fashion. Subject to these objections, and without waiver of these objections, Atlantic Richfield responds as follows.

Atlantic Richfield has conducted a diligent search of its records and has not found any documents specifically responsive to this question. However, Atlantic Richfield has identified certain employees who had knowledge of Terminal operations during the 1970's.

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- Ed Gilbert – Area Supervisor for ARCO Pipeline Company in 1977
- M. H. Leinbach – Terminal Supervisor in 1974
- W. A. Walls – Superintendent, Engineering and Repairs in 1970

4. *Identify the owners and operators of your establishment(s) in Philadelphia, Pennsylvania area from 1958 to the present. For each owner and operator further provide:*

   a. *The dates of their operation;*

   b. *The nature of their operation; and*

   c. *All information or documents relating to the handling and/or generation, storage, treatment, recycling, formulation, disposal, or transportation of any hazardous substance, hazardous waste, pollutant, contaminant, or other waste during the period in which they were operating the establishment(s).*

Response to Question No. 4

In its initial response, Atlantic Richfield responded that in addition to the general and specific objections above, and without waiver of these objections, Atlantic Richfield and its affiliated entities had a significant number of gasoline service station and distribution facilities in Pennsylvania, New Jersey and Delaware that may have been in operation during the relevant time span of 45 years, which have no relation or relevancy to the present matter. EPA asked Atlantic Richfield to engage in an overly broad and burdensome exercise to provide information that will not further EPA's inquiry regarding the Site. Subject to these objections, and without waiver of these objections, Atlantic Richfield responds as follows.

a. See Response to Question 2 above.
b. See Response to Question 2 above.
c. Atlantic Richfield has conducted a diligent search of its records and has not found any documents relating to the handling and/or generation, storage, treatment, recycling, formulation, disposal, or transportaion of any hazardous substance, hazardous waste, pollutant, contaminant, or other waste between 1958 and 1985 relating to the Fort Mifflin Terminal, except for the documents provided by EPA. However, in a draft Application by ARCO Pipe Line Company for Modifications to Existing Fort Mifflin Terminal to Berth 120,000 DWT Tankers, ARCO Pipe Line stated that it had "developed comprehensive Pollution Control Procedures, Waterfront Activity Procedures and appropriate emergency contingency plans...". Atlantic Richfield has not found any such documents despite a diligent search of its records.

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5. *Describe the types of documents generated or maintained by your establishment(s) in the Philadelphia, Pennsylvania area concerning the handling and/or generation, storage, treatment, transportation, recycling, formulation, or disposal of any hazardous substance, hazardous waste, pollutant, contaminant or other waste between 1958 and 1976.*

   a. *Provide a description of the information included in each type of document and identify the person who was/is the custodian of the documents;*

   b. *Describe any permits or permit applications and any correspondence between your company and/or establishment(s), and any regulatory agencies regarding the transportation and disposal of such wastes, and*

   c. *Describe any contracts or correspondence between your company and/or establishment(s) and any other company or entity regarding the transportation and disposal of such wastes.*

Response to Question No. 5

Subject to its general and specific objections and without waiver of its objections, Atlantic Richfield responds as follows:

a. See Response to Question 4 above.
b. As of March 1970, the Fort Mifflin Terminal, under Permit No.-6195, was operating a sewage plant which handled sanitation and kitchen discharges. In 1970, as part of the Delaware River Basin Commission's plan the Terminal began developing a pilot plant for additional water treating. The plant was expected to remove about 90% of all waste material from discharges to the Delaware River. Despite conducting a diligent search of its records, Atlantic Richfield has not been able to find Permit No. 6195.
c. See Response to Question 4 above.

6. *Identify every hazardous substance used, generated, purchased, stored, or otherwise handled at your establishment(s) in the Philadelphia, Pennsylvania area between 1958 and 1976. Provide chemical analyses and Material Safety Data Sheets ("MSDS"). With respect to each such hazardous substance, further identify:*

   a. *The process(es) in which each hazardous substance was used, generated, purchased, stored, or otherwise handled;*

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b. The chemical composition, characteristics, and physical state (solid, liquid, or gas) of each such hazardous substance;

c. The annual quantity of each such hazardous substance used, generated, purchased, stored, or otherwise handled;

d. The beginning and ending dates of the period(s) during which such hazardous substance was used, generated, purchased, stored, or otherwise handled;

e. The types and sizes of containers in which these substances were transported and stored; and

f. The persons or companies that supplied each such hazardous substance to your company.

Response to Question No. 6

Subject to its general and specific objections and without waiver of its objections, Atlantic Richfield responds as follows: See the Response to Question 4 above.

7. Identify all by-products and wastes generated, stored, transported, treated, disposed of, released, or otherwise handled by your establishment(s) in the Philadelphia, Pennsylvania area between 1958 and 1976. With respect to each such by-product and waste identified, further provide:

a. The process(es) in which each such by-product and waste was generated, stored, transported, treated, disposed of, released, or otherwise handled;

b. The chemical composition, characteristics, and physical state (solid, liquid, or gas) of each such by-product or waste;

c. The annual quantities of each such by-product and waste generated stored, transported, treated, disposed of, released, or otherwise handled;

d. The types, sizes, and numbers of containers used to treat, store, or dispose of each such by-product or waste;

e. The name of the individual(s) and/or company(ies) that disposed of or treated each such by-product or waste; and

f. The location and method of treatment and/or disposal of each such by-product or waste.

Response to Question No. 7

Subject to its general and specific objections and without waiver of its objections, Atlantic Richfield responds as follows:

On April 9, 1974, the M/S ELIAS was in the process of discharging crude oil at the Fort Mifflin Terminal when the vessel exploded. As a result of the explosion and fire, the ELIAS sank and one of the docks and loading facilities were destroyed and a quantity of oil was discharged into adjacent waters. In addition, Terminal buildings sustained blast and fragment damage; doors, ceilings and wall finishes were damaged. The initial oil pollution clean up was rendered by Clean Water, Inc. and Coastal Services, Inc. under the direction of the U.S. Coast Guard. Although the Coast Guard determined that leaving the hulk in place posed no immediate threat to the environment, Atlantic Richfield decided in early 1975 that the hulk posed a potential hazard to navigation and should be removed. The removal of the wreckage took approximately nine months in 1975, with the last of wreckage removed by November. Scrap metal was subsequently sold to two companies – Oil Tech and Ardvark Shipbreaking Corporation.

8. Did your company ever contract with, or make arrangements with Clearview, Folcroft, Folcroft Annex, Eastern Industrial, Tri-County Hauling, S. Buckly Trash Hauling, Barratt Rupurt, McCloskey Engineering, ABM Disposal Services, Marvin Jonas, Jonas Waste Removal, Paolino Company, Schiavo Bros., Inc., Gene Banta Trash Removal, and/or any other company or municipality to remove or transport material from your establishment(s) in the Philadelphia, Pennsylvania area between 1958 and 1976 for disposal? If so, for each transaction identified above, please identify:

a. The person with whom you made such a contract or arrangement;

b. The date(s) on which or time period during which such material was removed or transported for disposal;

c. The nature of such material, including the chemical content, characteristics, and physical state (i.e., liquid, solid, or gas);

d. The annual quantity (number of loads, gallons, drums) of such material;

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e. *The manner in which such material was containerised for shipment or disposal;*

f. *The location to which such material was transported for disposal;*

g. *The person(s) who selected the location to which such material was transported for disposal;*

h. *The individuals employed with any transporter identified (including truck drivers, dispatchers, managers, etc.) with whom your establishment dealt concerning removal or transportation of such material; and*

i. *Any billing information and documents (invoices, trip tickets, manifest, etc.) in your possession regarding arrangements made to remove or transport such material.*

Response to Question No. 8.

Subject to its general and specific objections and without waiver of its objections, Atlantic Richfield responds as follows: See the Response to Question 4 above.

9. *Provide the names, titles, areas of responsibility, addresses, and telephone numbers of all persons who, between 1958 and 1976, may have:*

a. *Disposed of or treated materials at Clearview, Folcroft and Folcroft Annex or other areas of the Site;*

b. *Arranged for the disposal or treatment of materials at Clearview, Folcroft and Folcroft Annex or other areas of the Site; and/or*

c. *Arranged for the transportation of materials to Clearview, Folcroft and Folcroft Annex, or other areas of the Site (either directly or through transshipment points) for disposal or treatment.*

Response to Question No. 9.

Subject to its general and specific objections and without waiver of its objections, Atlantic Richfield responds as follows: See the Response to Question 3 above.

10. *For every instance in which your establishment(s) disposed of or treated material at Clearview, Folcroft and Folcroft Annex or other areas of the Site, or arranged for the disposal or treatment of material at the Site, identify:*

    a. *The date(s) on which such material was disposed of or treated at the Site;*

    b. *The nature of such material, including the chemical content, characteristics, and physical state (i.e., liquid, solid, or gas);*

    c. *The annual quantity (number of loads, gallons, drums) of such material;*

    d. *The specific location on the Site where such material was disposed of or treated; and*

    e. *Any billing information and documents (invoices, trip tickets, manifests, etc.) in your company's or establishment's(s') possession regarding arrangements made to dispose of or treat such material at the Site.*

Response To Question No. 10.

Subject to its general and specific objections and without waiver of its objections, Atlantic Richfield responds as follows: See the Response to Question 4 above.

11. *Did your establishment(s) or any other company or individual ever spill or cause a release of any chemicals, hazardous substances, and/or hazardous waste, and/or non-hazardous solid waste on any portion of Clearview, Folcroft and Folcroft Annex or any other portion of the Site? If so, identify the following:*

    a. *The date(s) of the spill(s)/release(s) occurred;*

    b. *The composition (i.e., chemical analysis) of the materials which were spilled/released;*

    c. *The response made by you or on your behalf with respect to the spill(s)/release(s); and*

    d. *The packaging, transportation, and final disposition of the materials which were spilled/released.*

Response to Question No. 11.

Subject to its general and specific objections and without waiver of its objections, Atlantic Richfield responds as follows: See the Response to Question 4 above.

12. *Please identify individuals employed by your establishment(s) who were responsible for arranging for the removal and disposal of wastes, and individuals who were responsible for payments, payment approvals, and record keeping concerning such waste removal transactions at your Philadelphia, Pennsylvania area establishment(s) between 1958 and 1976. Provide current or last known addresses and telephone numbers where they may be reached. If these individuals are the same persons identified by your answers to question 3, so indicate.*

Response to Question No. 12.

Subject to its general and specific objections and without waiver of its objections, Atlantic Richfield responds as follows: See the Response to Question 3 above.

13. *Did you or any person or entity on your behalf ever conduct any environmental assessments or investigations relating to contamination at Clearview, Folcroft and Folcroft Annex or any other areas of the Site? If so, please provide all documents pertaining to such assessments or investigations.*

Response to Question No. 13.

Subject to the general and specific objections above, and without waiver of these objections, Atlantic Richfield responds as follows.

Atlantic Richfield has conducted a diligent search of its records and has not found any documents responsive to this Question. Should Atlantic Richfield find documents responsive to this Question subsequent to the date of this Response, Atlantic Richfield will provide such documents to EPA.

14. *If you have any information about other parties who may have information that may assist the EPA in its investigation of the Site, including Clearview, Folcroft and Folcroft Annex, or who may be responsible for the generation of, transportation to, or release of contamination at the Site, please provide such information. The information you provide in response to this request should include the party's name, address, telephone number, type of business, and the reasons why you believe the party may*

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have contributed to the contamination at the Site or may have information regarding the Site.

Response to Question No. 14.

Subject to the general and specific objections above, and without waiver of these objections, Atlantic Richfield responds as follows.

Atlantic Richfield has conducted a diligent search of its records and has not found any documents responsive to this Question. Should Atlantic Richfield find documents responsive to this Question subsequent to the date of this Response, Atlantic Richfield will provide such documents to EPA.

15. Representative of your establishment(s):

a. Identify the person(s) answering these questions on behalf of your establishment(s), including full name, mailing address, business telephone number, and relationship to Atlantic Richfield.

b. Provide the name, title, current address, and telephone number of the individual representing your establishment(s) to whom future correspondence or telephone calls should be directed.

Response to Question No. 15.

Subject to the general and specific objections above, and without waiver of these objections, Atlantic Richfield responds as follows.

a. Charles R. Pinzone, Jr., Esq., BP America Inc., 4101 Winfield Road, Warrenville, Illinois 60555, senior attorney for Atlantic Richfield Company. This address will be effective as of May 31, 2006.
b. See Response 15(a) above.

16. If any of the documents solicited in this information request are no longer available, please indicate the reason why they are no longer available. If the records were destroyed, provide us with the following:

a. Your document retention policy;

b. A description of how the records were/are destroyed (burned, archived, trashed, etc.) and the approximate date of destruction;

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c. *A description of the type of information that would have been contained in the documents; and*

d. *The name, job title, and most current address known to you of the person(s) who would have produced these documents; the person(s) who would have been responsible for the retention of these documents; and the person(s) who would have been responsible for the destruction of these documents.*

Response to Question No. 16.

Subject to the general and specific objections above, and without waiver of these objections, and upon information and belief, Atlantic Richfield responds as follows.

a. The Atlantic Richfield Records Retention Policy is enclosed and labelled, "Question 16(a)."

b.-d. In addition to the general and specific objections above, and without waiver of these objections, Atlantic Richfield and its affiliated entities had a significant number of gasoline service station and distribution facilities in Pennsylvania, New Jersey and Delaware that may have been in operation during the relevant time period of 26 to 44 years ago that have no relation or relevancy to the present matter. EPA has asked Atlantic Richfield to engage in an overly broad and burdensome exercise to provide information regarding the record retention history for this volume of sites that will not further EPA's inquiry regarding the Site.

Sincerely,

Charles Pinzone CAC

Charles R. Pinzone, Jr
Counsel for Atlantic Richfield Company

Enclosures

Cc: Walt Hufford (w/o encl.)

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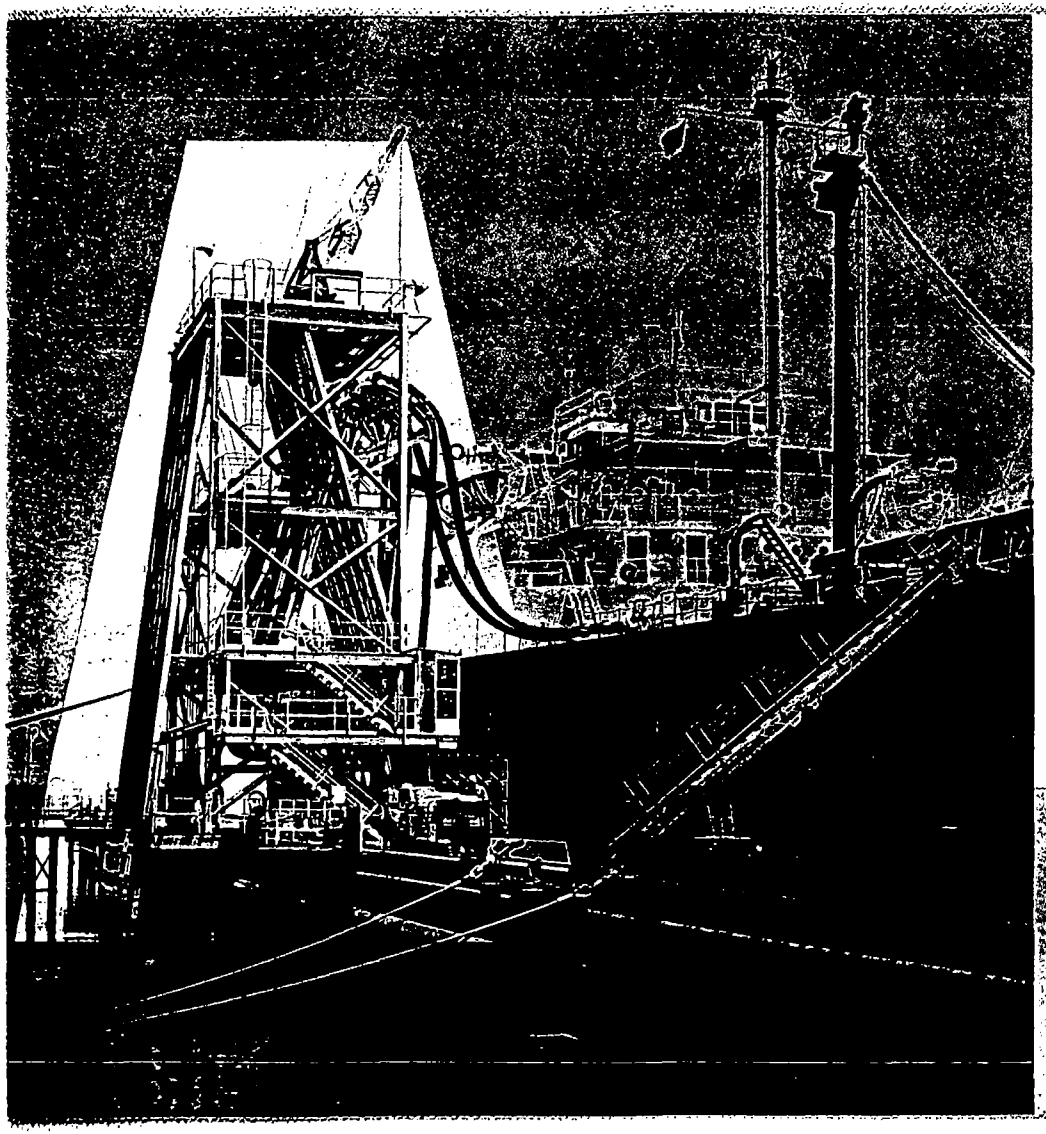
ATLANTIC RICHFIELD COMPANY

SUPPLEMENTAL 104(E) RESPONSE

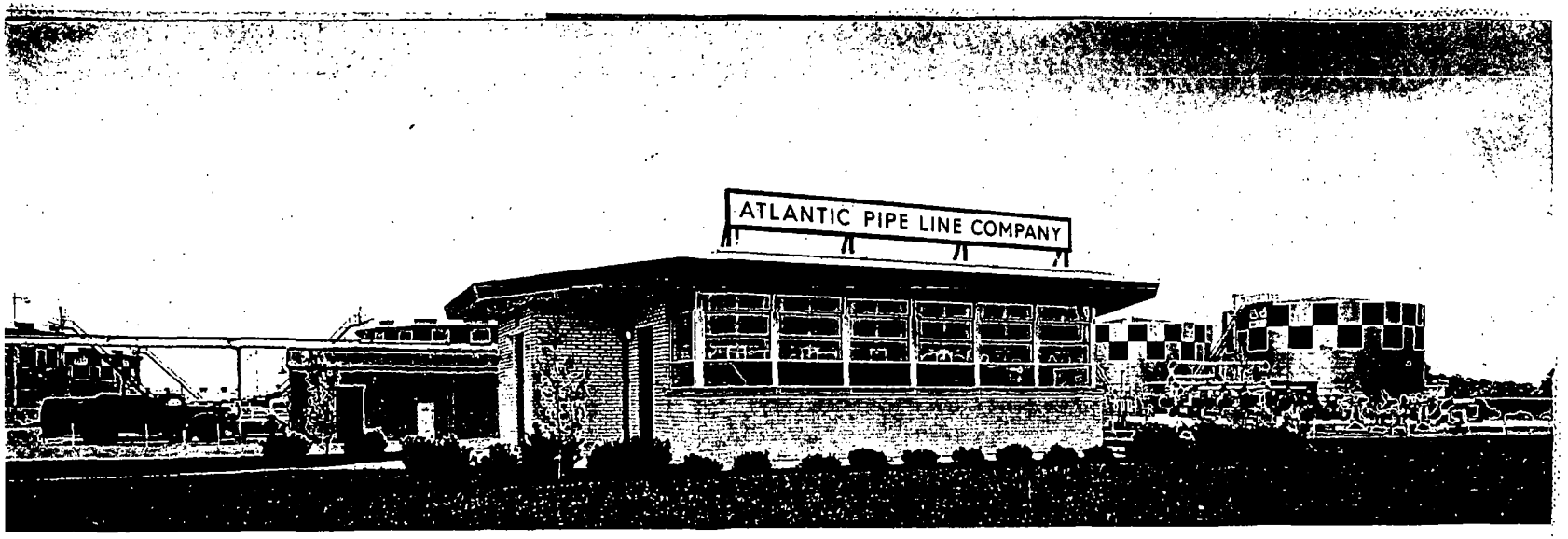
RESPONSIVE TO QUESTION # 2



Fort Mifflin Terminal

ATLANTIC PIPE LINE COMPANY

Philadelphia, Pa.



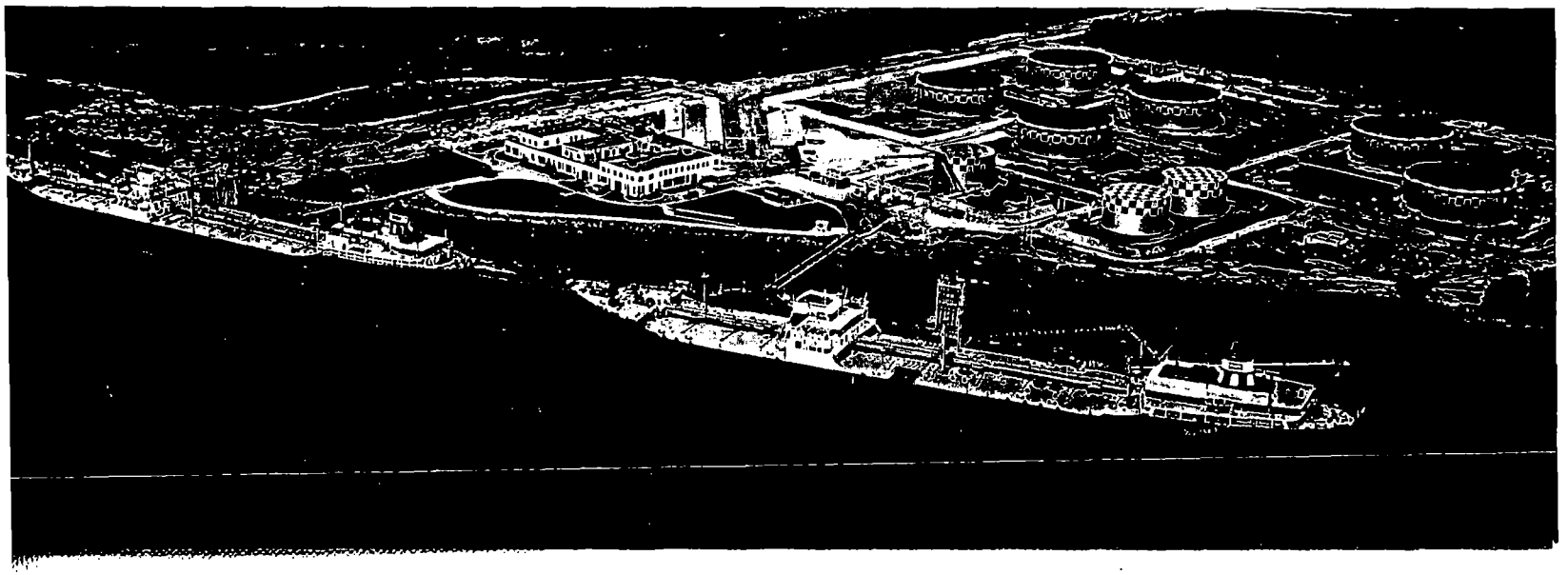
Situated at a strategic spot at Fort Mifflin to direct the unloading, transmission and storage of crude is Atlantic Pipe Line Company's Administration Building.

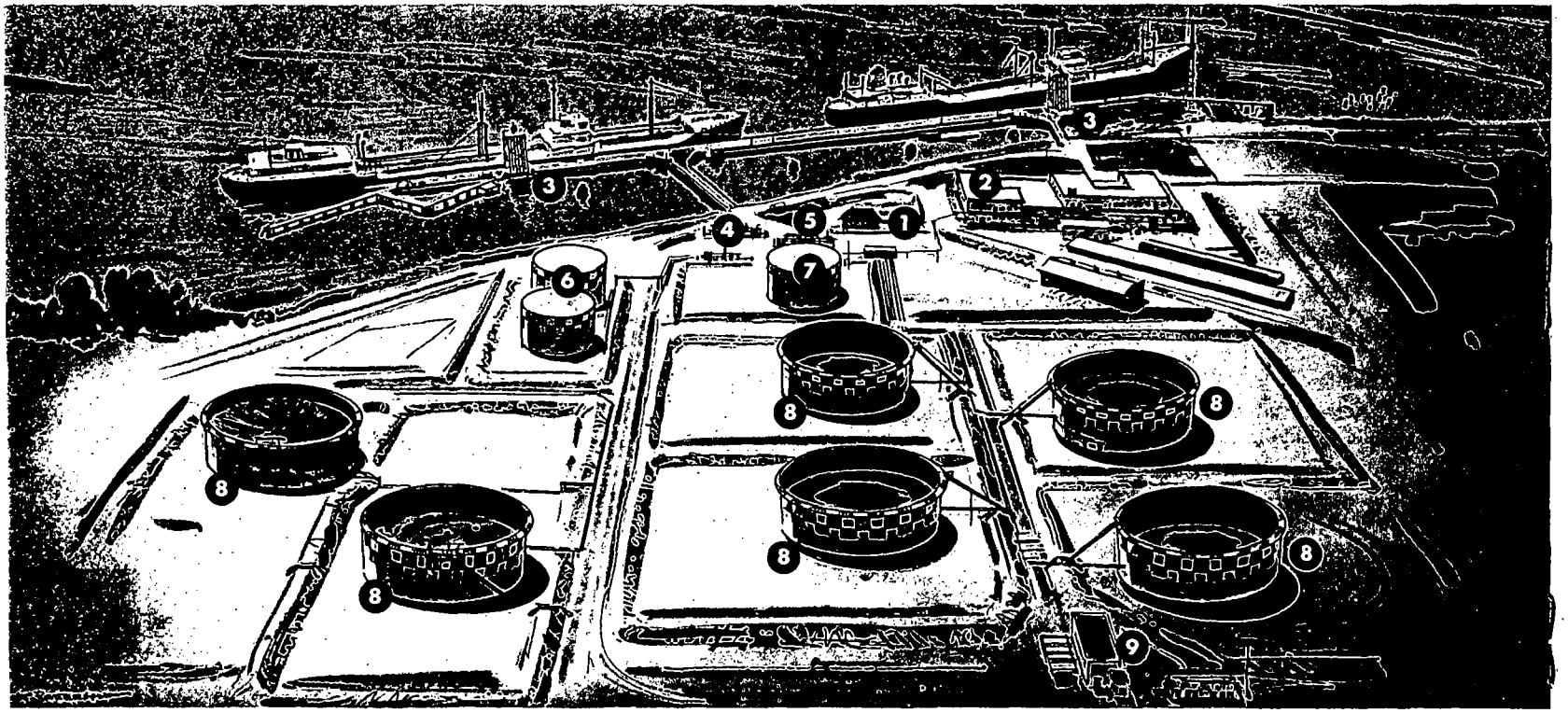
Two supertankers from The Atlantic Refining Company Fleet, the 48,000-ton SS. Atlantic Competitor *and the* SS. Atlantic Seaman, *30,000-tons, discharge crude oil alongside the dock at Fort Mifflin Terminal.*

Fort Mifflin Terminal . . .

Atlantic Pipe Line Company's Fort Mifflin Terminal provides berths for two tankers of the 50,000-ton class, with pipe lines and discharge hoses capable of unloading these ships at rates up to 30,000 barrels per hour.

The steel dock has a continuous fendering face 1200 feet long and a concrete deck 30 feet wide along its entire length. This clear deck surface facilitates servicing ships with provisions and stores while the cargo is being discharged. Fresh water and fuel oil are available to tankers

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requiring these services. Domestic or bonded fuel is metered from two 30,000-barrel tanks directly to ships' bunkers.

Each of the two unloading stations is equipped with an electrically-operated hose-handling structure fitted with four 10-inch cargo hoses and two 8-inch bunkering hoses.

A central manifold on shore provides flexibility for channeling cargoes from the 16" and 30" dock lines serving each berth to either the shore tanks or directly to the Philadelphia refinery of The Atlantic Refining Company.

Six insulated and steam-coiled cargo tanks, each of 80,000-barrel capacity, are used for receiving viscous crudes which require additional heating before being transferred to the Atlantic refinery.

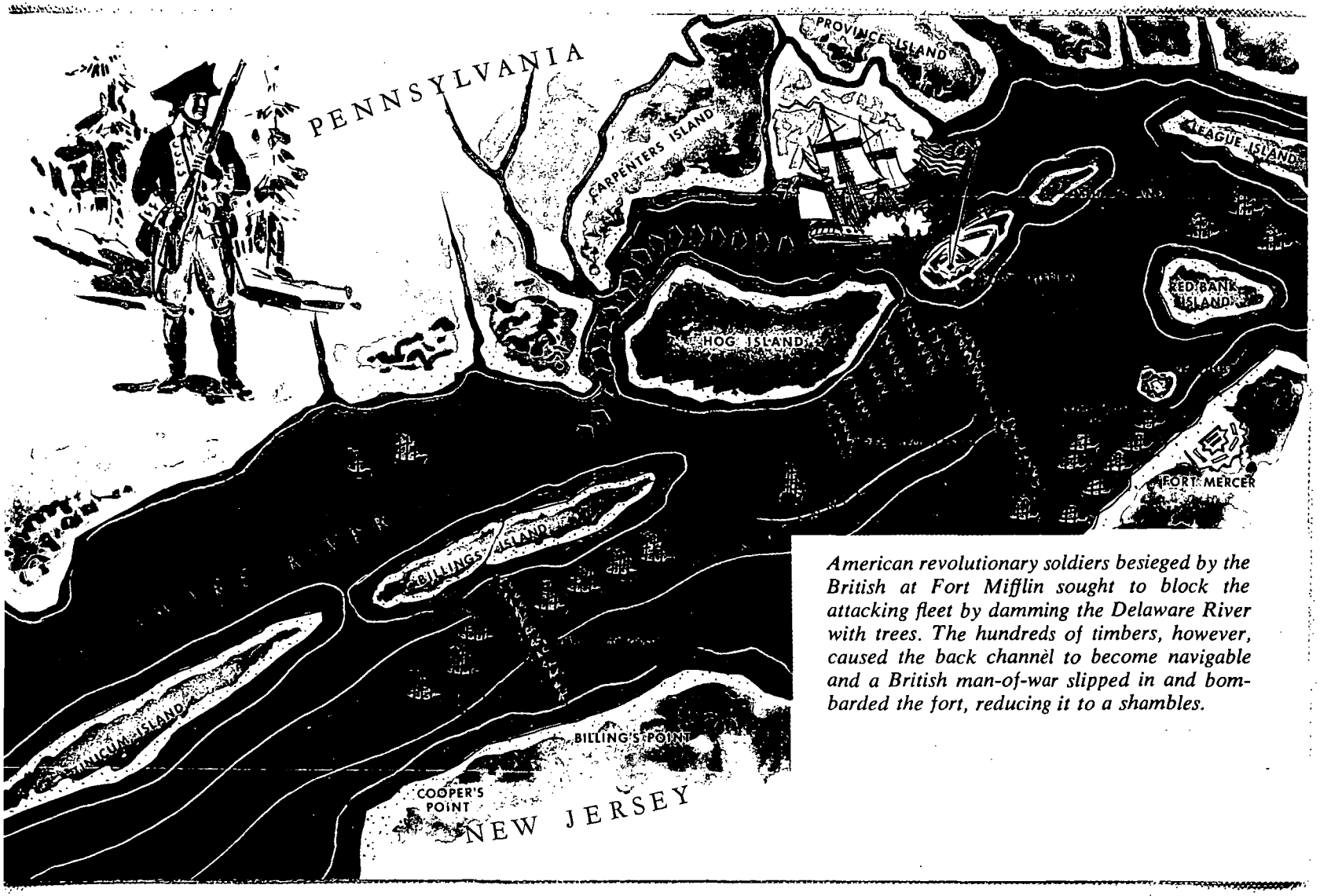
Three automatic boilers produce a maximum of 51,000 pounds of low pressure steam for heating the shore tanks and the steam traced bunker fuel system.

The pumping station at the rear of the tank farm has four 400 horse-power pumps capable of transferring four to five thousand barrels per hour through each of the two 16-inch lines to the refinery.

Two 30-inch lines are used to pump the lighter grades of oil directly from the ships to refinery storage located some three miles from the dock.

The Pipe Line Company's office provides space for the Terminal Supervisor and his assistant, giving a complete view of the operations on the dock. An office for use of the U. S. Customs Service and a conference room for area safety and operations meetings also are in this building ■

1. **Atlantic Pipe Line Company's Administration Building**
2. **Marine Administration Building**
3. **Hose Handling Structure**
4. **Central Manifold Area**
5. **Three 500 H.P., L.P. Boilers**
6. **Two 30,000 bbl. Bunker Oil Tanks**
7. **30,000 bbl. Storage Tank**
8. **80,000 bbl. Cargo Tanks**
9. **Pumping Station**



American revolutionary soldiers besieged by the British at Fort Mifflin sought to block the attacking fleet by damming the Delaware River with trees. The hundreds of timbers, however, caused the back channel to become navigable and a British man-of-war slipped in and bombarded the fort, reducing it to a shambles.

Historic Fort Mifflin . . .

Mud Island, the original site of Fort Mifflin, was first fortified in 1647 when the Swedes built a blockhouse to defend their fur trade against raids by Dutch rivals.

Construction of a second fort was started by the British in 1773, but was unfinished at the time of the Declaration of Independence. This fort was rushed to completion by the new nation, under the direction of Thomas Mifflin, Washington's first aide-de-camp, and has been known as Fort Mifflin since that time.

It was here that a garrison of 350 men withstood siege by the entire British fleet from October 1 to November 15, 1777. They abandoned their position only after the bombardment had reduced the fortifications to ruins and there remained but 40 men with no cannon in position to fire.

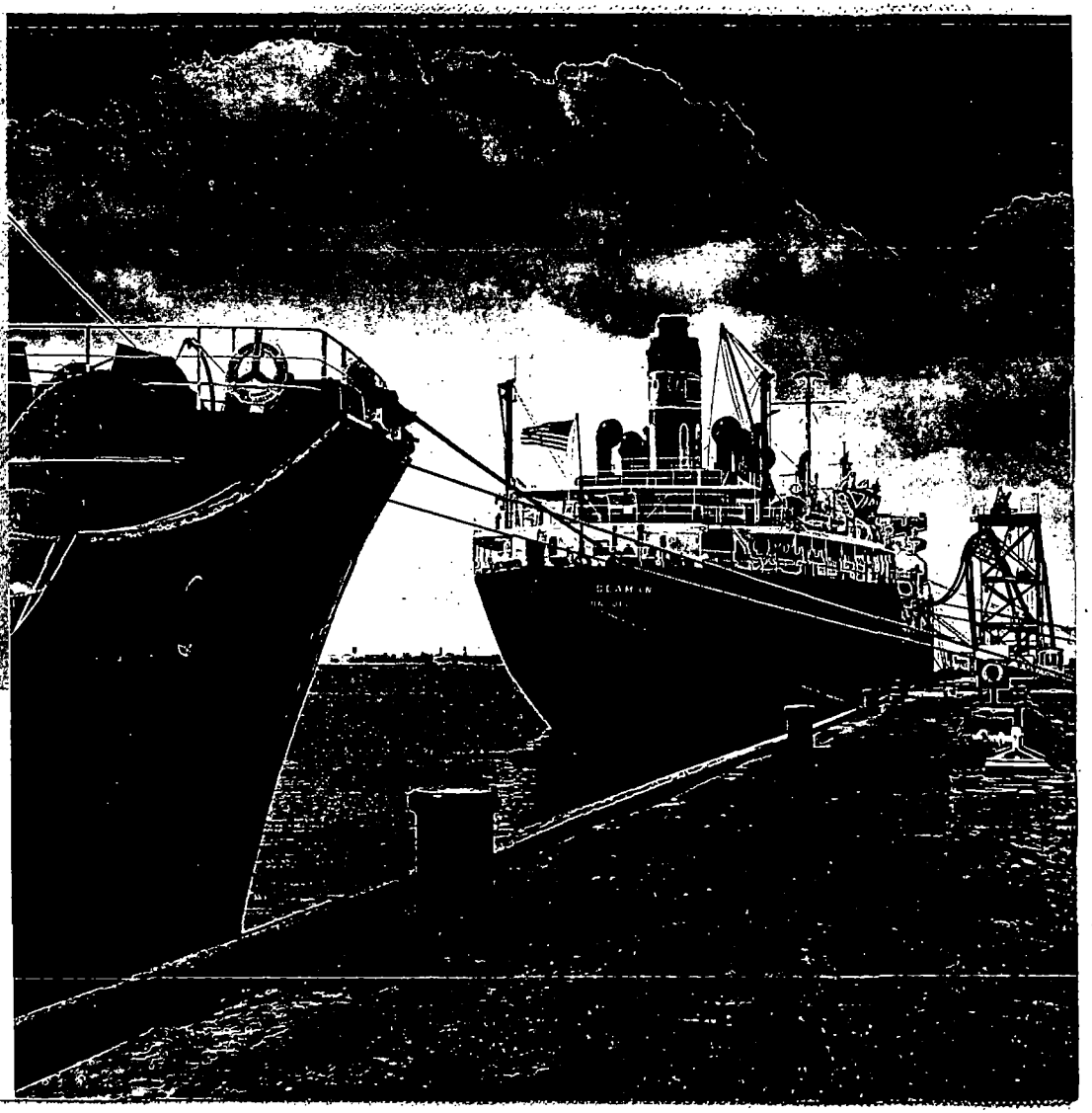
This action so delayed the British plan to quell the rebellion that it necessitated their remaining quietly in Philadelphia over the winter of 1777-78.

Much of the present fort was erected between 1798 and 1800 from plans drawn by Peter Charles L'Enfant, French architect and engineer, who also was commissioned to lay out the City of Washington.

The basic fortifications and the Commandant's Headquarters, Soldiers' Barracks, and Officers' Quarters, all standing today, date from that time.

The fort was last repaired and improved at the time of the Civil War, when it and similar installations on the Delaware River were used as military prisons.

The City of Philadelphia plans to convert the site of the old fort to a park area, preserving the fortifications as a reminder of the need of men to fight for and defend their liberty■



Fort Mifflin Terminal

ATLANTIC
PIPE LINE COMPANY

Philadelphia, Pa.

ATLANTIC RICHFIELD COMPANY

SUPPLEMENTAL 104(E) RESPONSE

RESPONSIVE TO QUESTION # 4

PROJECT STATEMENT

APPLICATION BY

ARCO PIPE LINE COMPANY

FOR

MODIFICATIONS TO EXISTING FORT MIFFLIN TERMINAL

ON THE DELAWARE RIVER

TINICUM TOWNSHIP, PENNSYLVANIA

TO BERTH 120,000 DWT TANKERS

PREPARED BY
HUDSON ENGINEERS, INC.
121 South Broad Street
Philadelphia, Pennsylvania 19107

No additional new dredging or embankment fill will be required for these modifications.

It is the intention of the applicant to operate the completed project in compliance with current U. S. Coast Guard and other Federal, State and local government agency regulations covering handling of petroleum products at this location.

The applicant has prepared and issued Dock Operations Manual which has been submitted to the U. S. Coast Guard, Captain of the Port for approval.

HISTORY AND DESCRIPTION OF THE EXISTING SITE

The site of the Fort Mifflin Terminal was acquired in 1941 when it was found that the existing marine terminal located adjacent to the applicants' refinery on the Schuylkill River at Point Breeze was inadequate to handle the larger tankers coming into operation due to limited depth of water and navigational restrictions.

A desirable site known as the "Henson Property" just west of Fort Mifflin and across from Mantua Creek Anchorage was available and was acquired.

The original marginal wharf constructed in 1941, immediately behind the Pierhead-Bulkhead Line, was 940 feet long and was dredged to a depth of 33 feet below mean low water and could discharge two 19,200 DWT tankers simultaneously. In 1951, to provide berthing space for two of Atlantic Refining Company's new 30,150 DWT tankers simultaneously, an extension 164 feet long was constructed at the east end of the existing wharf and two additional mooring dolphins with connecting walkways were added and the entire terminal and approach area was dredged to 37 feet below mean low water. In 1960, a further new extension 225 feet long was made on the west end of the existing wharf to provide adequate berthing space to accommodate simultaneously two of the new class of 45,800 DWT tankers which were planned for delivery in 1962 and once again the entire frontage and approach area was dredged to 45 feet below mean low water.

Permits for construction of the existing wharf were issued by the Philadelphia District Corps of Engineers as follows:

Date of Issue	Reference
August 3, 1940	-
April 19, 1949	680.4
November 9, 1950	-
March 17, 1960	800.6
July 22, 1960	285/70

Since completion of the tanker berth, it has been backed up by the construction of liquid transit tanks, transfer pumps and transfer pipe lines as required to handle the volume of oil being discharged from the tankers.

Examples of other similar terminals in the area both existing and projected are as follows:

On the Delaware River:

Gulf Oil Corp., Hog Island, Pennsylvania
Tenneco, Inc., Proposed L.N.G. Terminal, West Deptford, New Jersey
Pennwalt Corporation, Thorofare, New Jersey
G.A.T.X., Proposed Terminal, Thorofare, New Jersey
P.P.G. Industries, Inc., Thorofare, New Jersey
BP Oil Corp., Paulsboro, New Jersey
Humble Oil Company, Paulsboro, New Jersey
Mobil Oil Corp., Paulsboro, New Jersey

On the Schuylkill River:

Swann Oil Company, Inc. 67th Street, Philadelphia, Pennsylvania
Gulf Oil Corp., Penrose Avenue, Philadelphia, Pennsylvania
Atlantic Richfield Co., Point Breeze, Philadelphia, Pennsylvania

THE NEED FOR AND IMPACT OF THE PROPOSE PROJECT

The proposed modifications and improvement in the existing terminal to provide for the safe docking and undocking of 120,000 DWT tankers is the next logical step in the continuing program of the applicant to improve its efficiency and increase the volume of oil available to its Point Breeze Refinery to meet the increasing energy demand and the consequent necessity to deliver the crude oil in the largest available tankers which can navigate the present 40 foot channel.

The storage and handling of petroleum products is a relatively clean industry by accepted environmental standards in that it does not require process water and no appreciable contaminates are released into the air. Any contaminates released into the air are negated by approved emission control devices such as internal floating roofs, refrigeration or vapor recovery systems.

The one possible risk of contamination is from oil spills into the river or on the land area caused by human error or natural phenomena. Specifically, the applicant will provide on the proposed site, appropriate pollution control devices to handle such contingencies to include:

(1) A Pollution Control Task Group

(2) Floating Pollution Control Booms and Associated Clean-Up Apparatus

In addition, the applicant maintains contractual relationship with a United States Coast Guard approved Pollution Control Company Underwater Technics, Inc. which has vacuum trucks, pollution clean-up devices, a vacuum barge and additional booming capabilities, and is on call by land or water, 24 hours a day. The applicant also has developed comprehensive Pollution Control Procedures, Waterfront Activity Procedures and appropriate emergency contingency plans in accordance with Corporate policies which meet current Federal agency standards.

CBI ORIGINAL

ATLANTIC RICHFIELD COMPANY

SUPPLEMENTAL 104(E) RESPONSE

RESPONSIVE TO QUESTION # 5

4/6-0-2

FRANK B. FRIEDMAN

MANAGER'S CONSERVATION MEETING

January 20, 1971

Present: Messrs. H. E. Broadbent, J. W. Braun, C. B. Currin, W. O. Hoffmann W. S. Jennings, W. G. Kelly, R. G. Merman, N. E. Pennels, J. K. Teal, R. M. Walters, W. J. Wood

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Mr. Jennings gave a resume of the meetings that have taken place with the DRBC, State and City on the disposal of our waste water to the City Plant through a common line. Gulf, UTL and PGW were also involved. The two main points are the possibility of the City extending its interceptor system past our property on Penrose Avenue and the possibility of the DRBC allowing us to defer the line construction until the City completes its SW Plant modifications scheduled for 1977. This group will meet again on February 16.

Gulf is interested in the possibility of joining with us in a line to pick up sanitary wastes from Fort Mifflin and Gulf's adjacent dock facility. This line would cross the corner of the Airport and discharge to the City sewer.

Mr. Merman outlined the current program. Engineering is estimating on a line connecting us to the proposed Penrose Avenue interceptor and another directly to the City SW Plant. They are reviewing storm water storage problems, the disposal of West Yard run-off and the effect on the economics that the deferring of the line construction for several years would make.

He will have information completed for presentation about February 3.

Mr. Braun raised the question of Ballast Water Disposal at Fort Mifflin. Mr. Walters reported that this had been discussed in previous meetings with Fort Mifflin people and they felt that there was no problem.

Mr. Wood reported on plant operation. Generally satisfactory treatment has been maintained in both yards, with the exception of a poor week in December for the North Yard Plant. Slop oil disposal has created a serious problem. This was due to the main slop oil treatment tank being out of service for roof repair and the inability of the refinery to consume unfit gas oil. The situation has improved in the past several days.

Mr. Braun reiterated the need to emphasize the reduction of oil loss to the sewer rather than improve our ability to rerun unfit gas oil.

Mr. Walters reported the current status on air pollution violations. Three smoke violations were received this month. Hopefully the City might recognize the short duration and not process them all.

On licensing he reported that we were in good shape, having submitted 32 with another 27 about ready.

There will be about 100 tank licenses. These applications are ready, but we are waiting more instructions from the City on what additional information they want. The City expects that they cannot finish the program by October 1971 as expected.

He also reported on the AM improvement program, pointing out that the two areas of greatest concern now are the status of Sulfur Plant requirements and our problem of meeting the particular requirements for #853 Unit.

Mr. Kelly and Mr. Jennings discussed the work that had been done on reviewing the proposed AM Code Regulation V (Control of HC emissions). APIP and the Chamber of Commerce are going to report their objections to the APCB subcommittee.

Mr. Kelly explained the program that is underway to set up effluent standards for all industrial discharges. FWQA has put out a contract to look at all industrial processes and to develop minimum and maximum waste water treatment requirements for each segment. Ultimately this will result in individual effluent standards for each segment in terms of pounds waste per pound of product. While the contract has already been let, API has been asked to comment on it.

He also commented on the Executive Order No. 11574 (Licensing Discharges Under Refuse Act of 1899). He is to accumulate a list of all water discharges that might need to be licensed.

Mr. Wood commented on the recent MEK spill wherein a large quantity of it was discharged on the ground from a ruptured compartment of a tank truck. A large part of the waste water flow was diverted into the storm basin for about two hours. No ill effects were noticed even on the bio-pilot plant which was in service at that time.

R. M. Walters

cc: Attendees
Messrs. F. B. Friedman/
W. B. Halladay
K. J. Hickey

March 24, 1970

Mr. C. T. Beechwood
Regional Sanitary Engineer
Pennsylvania Department of Health
1400 W. Spring Garden Street
Philadelphia, Pa. 19130

Subject: Feasibility Report
Fort Mifflin Sewage Plant
Permit No-6195, Application No. 7937
Atlantic Richfield Company

Dear Mr. Beechwood:

We are now operating a sewage plant at the Fort Mifflin Terminal Building under the above permit. The facility takes care of sanitation and kitchen discharges through a gravity system to an imhoff tank and subsequent chlorination with effluent discharging to the Delaware River. As a result of the D.R.C.S. our allocation was 3 lbs U.O.D. with treatment equivalent to secondary treatment; disinfection, etc.

We are looking at the following methods of upgrading the installation to satisfy the requirements.

1. Upgrading the existing facility.
2. Septic tank with diffusion of effluent into the soil.
3. Installation of a new package unit with biological treatment.
4. Tie in to municipal systems of Tinicum Township or Philadelphia.

Our investigations indicate that methods 1 and 2 above are impractical as the existing plant cannot give us the required reduction in waste loading and the ground structure probably would not permit adequate diffusion.

We have found that there are several manufacturers who can supply package biological treatment plants that will satisfy the requirement. We have quotations for a Smith-Lovless units of 4000 and 9500 gallon flow per day. Our engineering section is developing installation costs for this type of unit.

After discussion with the sanitary engineer of Tinicum Township Municipal Sewage disposal plant, we were advised that they did not have sufficient capacity to handle our load and the nearest connection was several miles across the paved section of the Philadelphia Airport.

CBI ORIGINAL

ATLANTIC RICHFIELD COMPANY

SUPPLEMENTAL 104(E) RESPONSE

RESPONSIVE TO QUESTIONS # 2 AND 7

Introduction

Raw material for the Philadelphia Refinery is received by vessel at the ARCO Pipe Line terminal on the Delaware River at Fort Mifflin. In addition to raw material, light products are received over these facilities to supplement the product available from Philadelphia for the Eastern Region product demand. These pipeline facilities, except for incidental barge unloading of crude on the Schuylkill River, handle the entire crude supply for the Philadelphia Refinery. The Philadelphia Refinery is unique in this respect in that it is dependent on one facility for its raw material supply. Other company refineries having marine facilities are also connected to pipeline, either company pipelines or others. The East Chicago Refinery, which has no marine supply, can receive raw material from other pipelines in the Chicago area.

The Fort Mifflin facilities consisted of two berths with capabilities of handling 55 M DWT vessels. On April 9, 1974, the M/V Elias exploded, burned and sank while she was unloading crude at the "A" Berth of the Fort Mifflin dock. This catastrophe destroyed the usefulness of "A" Berth.

"B" Berth has continued in operation since the April 9 disaster. While we have had no serious difficulties to date in meeting Philadelphia supply requirements with a one-berth facility, at reduced refinery rates of 120,000 BPD, we have no assurance that our fortunate experience can be continued indefinitely. Should it become necessary to reach full refinery capacity of 185,000 BPD, the frequency of vessel delay would increase markedly. To lessen our vulnerability with a one-berth operation and as an insurance for continued raw material supply for the Philadelphia Refinery, a connecting 30" crude line will be laid between our Fort Mifflin facilities and Gulf's Hog Island Terminal (Photograph 51087, following page 5 shows the Gulf terminal with the route of the connecting pipeline indicated). Construction on this line will begin upon receipt of permit from the City of Philadelphia and execution by Gulf of an agreement regarding the use of their facilities. An AFE is moving forward for approval of the reconstruction of "A" Berth as a modern facility capable of handling 150 M DWT vessels which have been lightered off to enable them to navigate the 40 foot water depth.

We feel that it is necessary to remove the hulk of the Elias even if it were decided that "A" Berth would not be rebuilt. The hulk of the vessel is lying about 25 feet from the face of the remains of "A" Berth. It is surrounded by a spill boom which must be maintained to entrap oil seeping from the wreckage. The cost of maintaining the boom is not currently being paid by ARCO Pipe Line Company. The boom maintenance is under Coast Guard supervision with the maintenance cost being paid from the Coast Guard's contingency fund for subsequent recovery from responsible parties.

On July 26, it was necessary to dredge out approximately 7,500 cu. yards of material from the lower end of "B" Berth at a cost of $15,000. This material was a shoal which had built up approximately 350' upstream from the bow of the Elias with an area approximately 150' long and 75' wide. The peak of the shoal built up 10.2' in four months. Several ships had gone aground at their forward sections on this shoal before its removal. As long as the hulk of the Elias remains in its present position we can expect continued rapid build up of this shoal.

The Coast Guard's Captain of the Port, in his letter of 18 July 1974, has ordered that, " . . . in maneuvering vessels at your facility, no prop wash be introduced so as to impinge on the ELIAS or the containment boom about the ELIAS." This order in effect forbids us to move vessels "port side to," i.e., with their sterns towards the Elias. The Port Captain has identified the possibility of the capsizing of the floating bow section of the Elias. In addition to the additional care which is required in handling vessels docking and undocking and the restricted maneuverability which will be continued while the Elias hulk is in place, there is the risk of the forward floating section breaking loose. Additional lines have been run to the hulk to attempt to keep it fast but there is no assurance that in a docking accident or other mishap or during a hurricane or other severe weather the forward section wouldn't break free and damage "B" Berth. The lines attached to the hulk are to prevent it from outward movement but possible inward movement is not restricted.

It would theoretically be possible to build structures around or to the Elias to decrease its possibility of movement but this is not a practical solution to the problem. In addition, any additional impediments in this area will increase the already rapid shoaling rate. The only practical solution of the problem is to proceed with the removal of the Elias.

Project Description

Upon approval of the AFE, ARCO Pipe Line Company will be authorized to proceed with the removal of the hulk of the Elias. Legal endorsement of the AFE will be contingent upon removal of the hulk not being commenced until certain procedural steps are taken as directed by counsel in order to obtain the final position of the Corps of Engineers concerning removal of the vessel, and to assure our right to remove the hulk and dispose of the salvage material without weakening our position to recover our costs of removal from the vessel owner. Endorsement of the AFE by the Insurance Department will indicate that our proceeding with the salvaging will not jeopardize our rights to recover any insurance proceeds to which we may be entitled.

Approval of the AFE would authorize APL to solicit salvage proposals from various interested firms. These solicitations would include the general terms under which the salvor would work such as the clear right of APL to suspend salvage work when it deems necessary because of unloading of hazardous cargo at Berth B or for other reasons as well as the stipulations which the Coast Guard may have. The salvor would also have to provide a performance bond and an agreement to hold APL harmless as a result of any of his activities. The AFE would also give APL the authority to employ an engineering firm to prepare definitive specifications for salvage to be submitted to firms for competitive bidding. Our first choice is to not employ such a firm but to instead rely on the competing salvors to define their specifications and proposals. We would, under the authority granted to us by this AFE, be authorized to employ an engineering firm to assist us in evaluating the various proposals and bids.

We expect the bids or proposals to be either a lump sum with the salvor acquiring the salvaged material or a time and materials type contract with salvage receipts being deducted from the salvaging expenses. If an early approval is received for the reconstruction of Berth A, it may be possible to combine the salvaging of the Elias with the dismantling of "A" Berth and the subsequent reconstruction of "A" Berth. We intend to work out the best possible method for the removal of this debris at the lowest cost.

If the bids or proposals come within the dollars indicated in this AFE, APL would be authorized to proceed with the removal. If salvage costs and materials exceed the estimated amount, a supplement to this AFE will be prepared and submitted for Management's approval before the actual removal of the Elias is commenced. The project plan and budget portion of this AFE contains our estimate of dollar amounts and salvaging schedule.

Environmental Analysis

Shortly after the April 9 disaster, a $25M damage suit was filed against the vessel owner. A countersuit of $50M was filed against Atlantic Richfield Company and ARCO Pipe Line Company. We are confident that the Coast Guard's inquest into the incident will find the probable cause of the explosion and fire was not the result of any of APL's activities; however, due to the possible application of the Ship Owner's Limitation of Liability Act, we may be limited in our damage recovery to the remaining value of the vessel and its cargo. Correspondence in the Supporting Data section of this AFE goes into more detail on this point.

Various administrative steps have been taken to attempt to have either the U. S. Coast Guard or the United States Army Corps of Engineers remove the hulk. These steps have been unsuccessful and it appears in our best interest to now proceed to remove the sunken vessel. Correspondence regarding the steps taken in the attempt to have them remove the vessel are also contained in the Supporting Data section.

We have not included any possible insurance proceeds nor possible amounts recovered from vessel owners in our AFE.

We may expect considerable Coast Guard interest in our salvaging. They desire to keep any remaining oil in the vessel from escaping into the river and both the Coast Guard and the Corps of Engineers have an interest that no debris become a hazard to navigation. We feel that neither the Coast Guard nor the Corps of Engineers' requirements would be unduly restrictive.

With the increasing value of salvaged material, we do not anticipate any difficulty in securing qualified salvage firms to make salvage proposals to us.

Project Plan and Budget

The removal costs which would be expended in 1974 were not included in the budget. We will, however, include the 1975 expenditures in our 1975 budget. We estimate that the removal costs will amount to approximately $2M. Salvage recovery should amount to approximately $500M making a net expenditure of $1.5M . We estimate an additional $50M for incidental engineering services, permit acquisition cost and other incidental expenditures such as a contingent requirement for us to provide inspection by divers at our own costs (report of Navy divers included in the Supporting Data),

Our time tables are as follows:

Project Timetable:

September 1, 1974	Approval of AFE
October 15, 1974	Awarding of contract
November 1, 1974	Contractor begin work
May 15, 1974	Salvaging completed

Project Expenditures:

$ - M

Year	Qtr.	Salvaging Costs	Salvage Receipts	Net Expenditure
1974	3	$ 10	$ -	$ 10
	4	400	75	325
1975	1	1,200	275	925
	2	400	150	250
	3	40	-	40
Total		$2,050	$ 500	$1,550

Project Management and Organization

A three-man task force was appointed shortly after the Elias explosion. The charter of this Task Force is included under Supporting Data (Page 6). The solicitation and evaluation of the salvage proposals will be done by the Task Force. The Task Force is made up of the following APL employees:

M. H. Leinbach, Philadelphia Area District Supervisor, Task Force Chairman, Fort Mifflin

W. A. Schaid, Civil and Mechanical Engineering - Independence

C. E. Alexander, Sr. Accountant - Wayne

Mr. Schaid will serve as project engineer for the project. Hudson Engineering, Inc. of Philadelphia is doing the engineering design for the replacement of "A" Berth at Fort Mifflin. Their services may be utilized to assist in this project. The normal approval guide for APL will be applicable.

Report and Controls

ARCO Pipe Line Company's cost control accounting system will be used to account for commitments and expenditures with this AFE. Post audit recommendations are for a review of actual expenditures Vs. AFE estimate.

ORIGINAL

ATLANTIC RICHFIELD COMPANY

SUPPLEMENTAL 104(E) RESPONSE

RESPONSIVE TO QUESTION # 7

Date: June 10, 1974

To: Mr. B. E. Milner

From: C. M. Lynch

Subject: M/S ELIAS - Explosion/Fire - April 9, 1974

Messrs. D. E. Rosenbaum, R. F. Thompson, J. E. Woods and the writer met with representatives of the U. S. Coast Guard at their offices in Washington, D. C., on June 7, 1974.

The meeting was arranged at our request to determine Coast Guard position with respect to pollution clean up costs, hulk removal, etc. Representing the Coast Guard were Rear Admiral Robert Price, Chief, Environmental Affairs; Rear Admiral Richard A. Ratti and Captain Clarence R. Halburg, General and Assistant General Counsel respectively.

The understanding reached at the meeting, which lasted one hour and 45 minutes was:

1. The Coast Guard indicated that it would pay all pollution clean up costs except for services which others have contracted for. They also indicated they at present have invoices totaling approximately $600,000 and anticipate that total clean up costs will approach $1,000,000.

2. The Coast Guard did agree to do what in their judgment is necessary to clean up pollution in order to remove even a minor threat to the area (conceivably this could mean no more than oil removal). We endeavored to get a timing commitment on this along with a commitment for hulk removal, if necessary, to remove pollution source. We reminded them that the 1974 Hurricane Season was fast approaching and a severe storm in the area could conceivably capsize the hulk. Our plea fell on deaf ears. The Coast Guard indicated that we cannot look to them for removing any more of the hulk than is absolutely necessary to solve the pollution problem.

We learned at the meeting that the findings of the Coast Guard investigation may not be available for at least six months. The reason, as you know, is that investigation even now is incomplete. More testimony is to be taken commencing June 18 after which they

cc: RFT
RBH
LCF
JCG

will probably commence drafting the report. We feel that it is important that you know this because presumably Legal will not want to push the case until the Coast Guard findings, which should prove our innocence, are known.

As we view the problem, there are two courses of action to follow:

1. Contract with Salvors to remove the hulk, or

2. Await the findings of the Coast Guard investigation and then push for the vessel owners to remove.

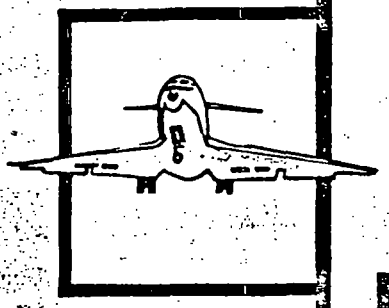
While some may argue that we should await findings of the Coast Guard investigation, we question the merit of this. This case could well require years to resolve in the Courts, during which time we would be denied the use of our facility, or for that matter, would be unable to repair until hulk is removed. Although it is a bitter pill to swallow, it may be better to "bite the bullet" and proceed toward contracting directly for removal of the stricken vessel after Coast Guard completes oil removal while continuing the Legal process to recover costs from owner.

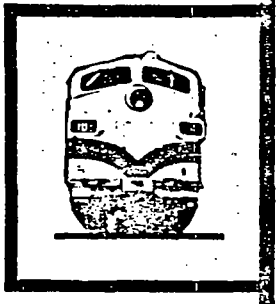
Mr. Rosenbaum is meeting with the District Engineer, U. S. Army Engineers for Philadelphia, and his Chief Counsel, today at which time he will advise them of the posture of the Coast Guard. He will attempt to get them to defer a final decision on removal until the Coast Guard decides on how far it will go in removing the oil. He will also advise them that we are obtaining a scrap metal estimate of the value represented by the ELIAS hulk. These factors may help determine how much money is involved in removal from the Engineers. We may want to consider indemnifying the Corps for removal costs as we did a short time ago with the Coast Guard although, quite frankly, we question the merit of whether this will make the Corps act.

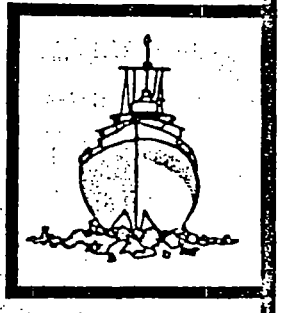
C. M. Glynch

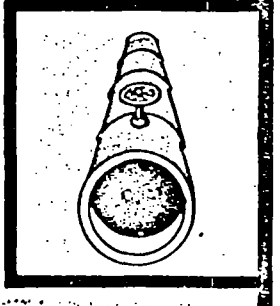
CML/slm

cc: Messrs: R. C. Dulaney
E. J. Kettle
D. E. Rosenbaum
J. E. Woods









NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

MARINE ACCIDENT REPORT

M/T ELIAS
EXPLOSION AND FIRE AT THE
ATLANTIC RICHFIELD COMPANY
FORT MIFFLIN TERMINAL
DELAWARE RIVER, PENNSYLVANIA
APRIL 9, 1974

REPORT NUMBER: NTSB-MAR-78-4

UNITED STATES GOVERNMENT

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. NTSB-MAR-78-4	2.Government Accession No.	3.Recipient's Catalog No.
4. Title and Subtitle Marine Casualty Report - M/T ELIAS Explosion and Fire at the Atlantic Richfield Company Fort Mifflin Terminal, Delaware River, Pennsylvania, April 9, 1974		5.Report Date May 17, 1978 6.Performing Organization Code
7. Author(s)		8.Performing Organization Report No.
9. Performing Organization Name and Address National Transportation Safety Board Bureau of Accident Investigation Washington, D.C. 20594		10.Work Unit No. 2346 11.Contract or Grant No.
12.Sponsoring Agency Name and Address NATIONAL TRANSPORTATION SAFETY BOARD Washington, D. C. 20594		13.Type of Report and Period Covered Marine Casualty Report April 9, 1974 14.Sponsoring Agency Code
15.Supplementary Notes		

16.Abstract

On April 9, 1974, the tanker M/T ELIAS (Greek), while discharging crude oil, exploded, burned, and sank at the Atlantic Richfield Company Fort Mifflin Terminal on the Delaware River at Philadelphia, Pennsylvania. The ELIAS was destroyed; five crewmembers and three visitors were killed; four crewmembers and one visitor are missing and presumed dead. The tanker S/S STEINIGER (Liberian) at the next berth was slightly damaged, and surrounding waters were polluted with oil. Damage to the ARCO terminal was estimated to be $2 million. The sunken hulk of the ELIAS obstructed use of the berth for 19 months.

The National Transportation Safety Board determines that the probable cause of the accident was the inadequate maintenance of cargo tanks and the sanitary system which allowed volatile cargo vapors to enter compartments containing ignition sources. The location of accommodations over cargo tanks contributed to the loss of life.

The Safety Board made recommendations to the U.S. Coast Guard regarding vessel control; communication, investigation, and boarding procedures; port terminal regulation; crew survival and visitor safety.

17.Key Words	18.Distribution Statement
Tankers, midshiphouse design; explosion; fire; crude oil; terminals; firefighting; communications; life-saving; ignition sources; gangways; accommodations; inspections; investigations; lifeboats; escape capsules; vessel control; hazardous cargo; visitors on tankers.	This document is available to the public through the National Technical Information Service, Springfield, Virginia 22151

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NTSB Form 1765.2 (Rev. 9/74)

CONTENTS

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

MARINE ACCIDENT REPORT

Adopted: May 17, 1978

M/T ELIAS EXPLOSION AND FIRE
ATLANTIC RICHFIELD COMPANY
FORT MIFFLIN TERMINAL
DELAWARE RIVER
PHILADELPHIA, PENNSYLVANIA
APRIL 9, 1974

SYNOPSIS

About 2150 e.d.t., on April 9, 1974, the tanker M/T ELIAS (Greek), while discharging crude oil at the Atlantic Richfield Company Fort Mifflin Terminal on the Delaware River at Philadelphia, Pennsylvania, exploded, burned, and sank. The ELIAS was destroyed; five crewmembers and three visitors were killed; four crewmembers and one visitor are missing and presumed dead. The tanker S/S STEINIGER (Liberian) at the next berth was slightly damaged and surrounding waters were polluted with oil. Damage to the ARCO terminal was estimated to be $2 million. The sunken hulk of the ELIAS obstructed use of the berth at the terminal for 19 months before all wreckage was removed.

The National Transportation Safety Board determines that the probable cause of the accident was the inadequate maintenance of cargo tanks and the sanitary system which allowed volatile cargo vapors to enter compartments containing ignition sources. The location of accommodations over cargo tanks contributed to the loss of life.

INVESTIGATION

The Accident

On April 2, 1974, the tankship M/T ELIAS, of Greek registry, departed La Salina, Venezuela, with 209,099 barrels of crude oil, bound for the Atlantic Richfield Company (ARCO) Fort Mifflin Terminal on the Delaware River at Philadelphia, Pennsylvania. Upon departure, the cargo tanks' steam heating system was activated to maintain the oil cargo at pumping temperature.

The voyage was uneventful until 2215 1/ on April 7 when a fire was discovered around the hatch trunk leading into the No. 3 starboard wing cargo tank. Smoke also was seen coming from the main deck storage area of the midshiphouse. The ship's crew reportedly put out the fire in about 5 minutes, using firehoses and the vessel's steam smothering system. About 32 inches of salt water accumulated in the midshiphouse storage area during the firefighting. The main engines of the ELIAS were stopped from 2145 to 2320 during the incident.

The deck department logbook, which was recovered from the ELIAS wreck and translated, had only an 0800 line entry on April 7 of meteorological data and the ship's heading. There were no logbook entries about the fire. The crew did not investigate to determine the cause of the fire.

An emergency radio message broadcast from the ELIAS at 2255, and intercepted by the U.S. Coast Guard, Fifth District, at Norfolk, Virginia (CCGD FIVE), was cancelled by the ELIAS at 2325 without need for Coast Guard action. CCGD FIVE then filed a single "ELIAS situation report" priority message, action to Commander, Atlantic Area (COMALANAREA) and information to: the Commandant, Coast Guard (COMDT COGARD); Coast Guard Marine Inspection Office, Philadelphia (MIO PHILA); and Captain of the Port, Philadelphia (COTP PHILA). This message described the ELIAS cargo as "Bunker C oil," and noted "one hold on fire;" it advised that the vessel was continuing on to Philadelphia, and gave Chas. Kurz Co., Philadelphia, as the ship's agent; the Coast Guard did not relay this information to the agent or to the ARCO terminal manager.

The ELIAS arrived at the ARCO terminal at 1530 on April 8 and was secured to berth "A". A gangway was positioned portside amidships near the ship's cargo manifold. ARCO personnel boarded and took three representive cargo tank ullages and samples; the temperature of the crude oil was recorded at 125° to 135° F. The shoreside cargo transfer hookup was made using 10-inch hoses and a bonding cable. Permission was granted and cargo discharge started at 1825. The cargo discharge continued into April 9 without incident except for low pumping pressure and some difficulty in emptying No. 11 center tank.

1/ All times herein are eastern daylight time based on the 24-hour clock.

About 1330 on April 9 an officer from the MIO PHILA boarded the ELIAS to investigate the reported fire at sea. The chief mate of the ELIAS told the officer that the fire had been in the midshiphouse and had ignited heated fumes from No. 3 starboard tank ullage opening, thereby starting the fire at the tank. The investigator noted the warmth of the main deck, and the mate told him that it was caused by the heated cargo. The cause of the fire in the midshiphouse was not determined, however.

At 1400, a two-man boarding team from the Coast Guard, Captain of the Port Office, Gloucester, New Jersey, arrived to conduct a routine "checklist" inspection of a discharging tanker. The team found three flame screens missing, which the chief mate immediately replaced. The boarding team conferred with the MIO PHILA investigating officer concerning the fire but did not inspect the damage. The investigating officer prepared a Coast Guard special inspection report; he left the ship at 1415. The inspection team departed at 1435. No conditions were found aboard the ELIAS by either the investigating officer or inspection team to warrant stopping of cargo discharge.

The tankship S.S. EDWARD STEINIGER arrived at 1750 on April 9 and moored at berth "B," bow to bow with and about 100 feet forward of the ELIAS. The STEINIGER had a full load (about 44,439 tons) of crude oil for delivery and started discharge at 1840.

The discharge of the ELIAS cargo was controlled aboard ship by the chief mate. During the 2000 to 2400 watch, he was being assisted on deck by the second mate, a pumpman, and an ablebodied seaman. The seaman testified that he had assisted the pumpman to close No. 3 tank and open No. 2 tank (center or wing not specified) discharge lines early in his watch. He testified that about 3 feet of cargo remained in the No. 8 center tank and about 2 1/2 feet of cargo remained in No. 9 center tank. The 12 to 4 watch seaman testified that Nos. 2 through 6 port and starboard wing tanks had been stripped during his watch and that No. 11 had not been drawing properly. The 8 to 12 watch prepared coffee in the midshiphouse officers' quarters shortly before 2130, after which he went to the afterhouse.

The ELIAS exploded about 2150. The midshiphouse was immediately engulfed in flames; the ship burned and sank almost immediately at its berth.

Injuries to Persons

Injuries	Crew	Visitors	Other
Fatal	5	3	0
Missing	4	1	0
Nonfatal	7	0	1
None	18	0	0

Damage to Vessel

The ELIAS was destroyed.

Other Damage

Nearby ARCO terminal buildings sustained blast and fragment damage. Windows and light fixtures were broken; doors, ceilings and wall finishes were damaged; and some walls were cracked. Damage to the ARCO terminal water system was significant and delayed the firefighting effort. Berth "A" sustained the greatest damage.

The STEINIGER sustained minor damage despite her proximity to the ELIAS.

Crew Information

The ELIAS crew list showed 34 members upon arrival at Philadelphia. The crew was predominantly Greek but also included Turks, Cypriots, Ethiopians, Indians, and a Brazilian. This mixture of nationalities presented problems with technical term interpretations during the Marine Board of Investigation hearings. Manning was typical for a tanker of this size as to departmental distribution and billet assignment. At the time of the accident, the radio operator, the boatswain, and most of the Steward's Department were ashore on liberty. Of the crew called as witnesses, two had been aboard the ELIAS for 1 year while the rest had served only 2 to 8 months.

The master and the chief, second, and third mates were inside the midshiphouse and were killed in the explosion. The pumpman was last seen on deck handling the cargo discharge and was listed among those missing after the explosion.

Vessel Information

The ELIAS, a twin-screw motor tanker of riveted and welded steel construction, was built in Gothenberg, Sweden, in 1956. It was transferred from Norwegian to Greek registry in February 1973. The ELIAS ahd been transporting crude oil since October 1973 and had made 10 voyages.

The ELIAS was a conventionally configured tanker. (See figure 1.) It had a raised bow forecastle deck and a "midshiphouse," located over the cargo tanks, which contained the navigation bridge, hospital, dining and smoking saloons, and accommodations for the master, radio operator, and deck officers. A "poopdeck" house at the stern, over the engineroom, provided accommodations for the engineer, officers, and other crewmembers. A centerline catwalk above the main deck joined the midshiphouse with the forecastle and poopdeck.

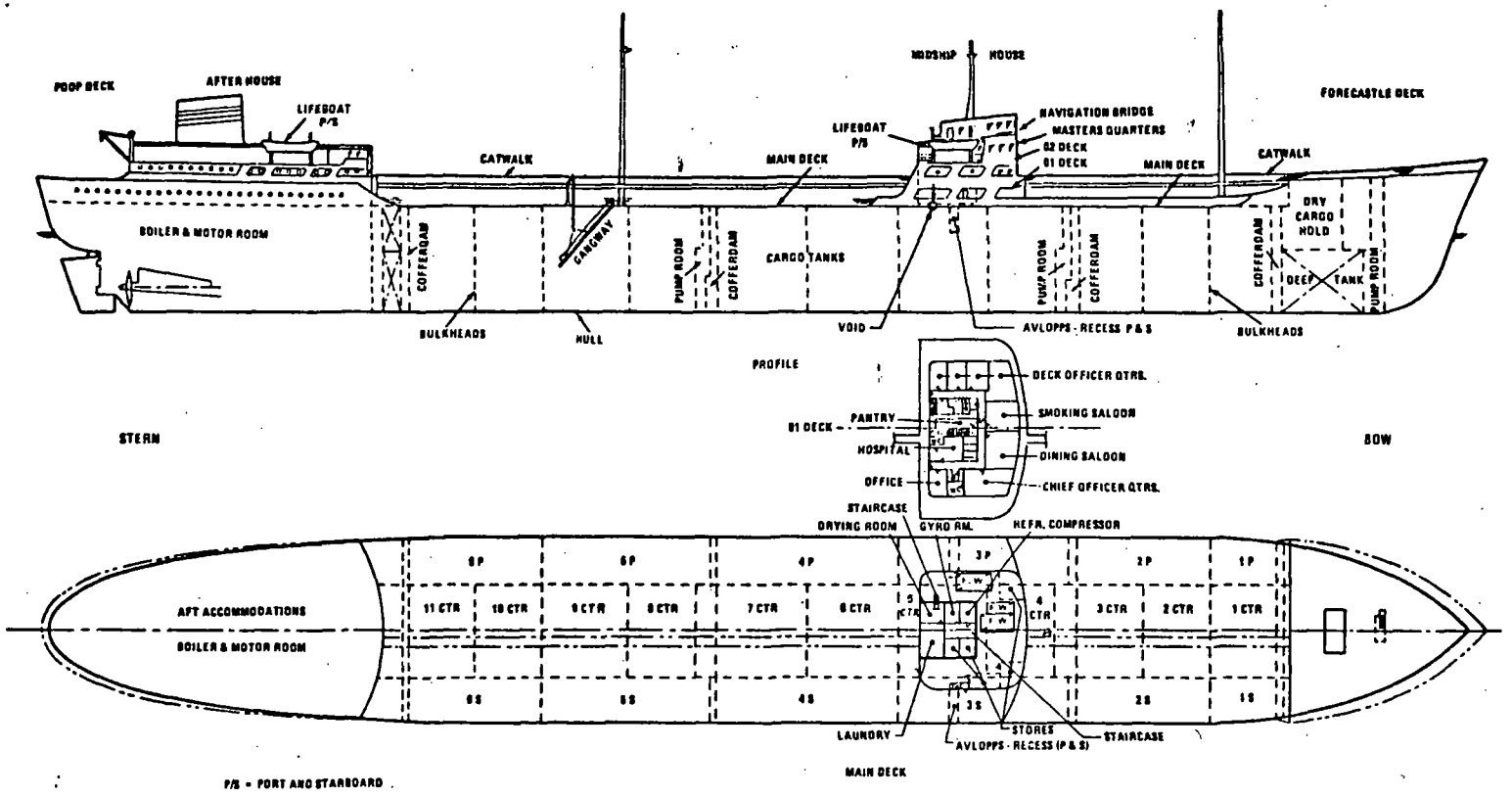

Figure 1. Profile and plan view of M/T ELIAS.

The ELIAS had 23 cargo tanks between the forecastle and the engineroom. Void space cofferdams separated the cargo space from the bow and stern sections. The tanks were arranged into three longitudinal groups: the centerline cargo tanks numbered 1 through 11, from forward to aft, varied in size from 58,128 to 77,491 cubic feet; the wing tanks numbered 1 through 6 from forward to aft, port and starboard outboard of the centerline tanks, varied in size from 23,580 to 75,802 cubic feet. The ship had three pumprooms: the first, forward at the break of the forecastle deck, was used to transfer fuel oil; the second, located between centerline cargo tanks Nos. 3 and 4, and the third, between centerline cargo tanks Nos. 7 and 8, were used for cargo operations. The ELIAS was not fitted with an inert gas system nor was it required to be.

The midshiphouse accommodations were located at the 01 deck level and above. A segregated compartment at the main deck level included the laundry, drying, gyrocompass, refrigeration compressor, and several other small store rooms. Access to this compartment was by an internal stairway from the 01 deck level. This segregated compartment was elevated slightly above the main deck by a void space separating it from the cargo tanks. Sanitary drain lines from the laundry room equipment fed through this void into the "avlopps-recess" (see figure 1) for discharge.

An inspection report of the vessel at Haugesund, Norway, in January 1973, noted that the ship had been laid up for 10 months. The report showed the main deck in "relatively good condition" and, in the machinery room, "The general impression of maintenance was relatively good." It described the observation tank 2/ as "dirty inside, indicating heating coils may be leaky." Under electrical equipment, the report stated: "Hot sanitary water pump - full grounding - must be checked" and noted problems with machinery fans "aft port switch in front of starter defect... and...aft starboard - one coil in the starter mechanically damaged and will soon fail...." "Some expense needed to commission electrical plant, but be neglectible [sic] if done by competent crew." The dry cargo hold forward was entered to survey spare parts, but there is no indication that any interior inspection was made of the cargo tanks.

The last "special survey" of the vessel was made during July-August 1969 in Lisboa, Portugal, by the classification society Det Norske Veritas. The vessel was laid up from April 1972 until February 1973, when the new owner took delivery.

2/ Used in the contaminated-steam drain collecting system to act as the receiver for contaminated drains from fuel oil, lube oil, and oil tank heating systems. This system is kept isolated from the clean steam drain system. The inspection section is fitted with an inspection port with a light set at the waterline. It is fitted with scum drain, test connection, removable cover, vent, and a drain to the bilge.

A report dated May 8, 1973, shows that drydocking and repairs to the ELIAS were performed between February 12 and 14, 1973. Work was accomplished on steam piping and steam valves. The report noted: "In main pumproom the discharge line of starboard cargo pump repaired by plastic steel." This repair would be unacceptable to the U. S. Coast Guard except as an emergency repair. Work was also performed on the ELIAS from February 1 to 8, 1973, at Bovagen, Norway. There was no evidence of work orders directing electrical repairs, or cargo tank repairs or cleaning during either of the foregoing periods. In the 5 months that the boatswain had been aboard, he testified that only No. 2 tank had been cleaned, in December 1973.

Waterway Information

Fort Mifflin terminal is on the north bank of the Delaware River and close to Philadelphia International Airport. The run from Delaware Bay entrance, and the pilots' station, is 87 miles in marked channels. The berthing pier is close to and parallel with Mifflin Range channel, which is about 300 yards wide. 3/ Two causeways provide access to the pier. In 1961, two vessels had broken mooring lines due to waves created by passing vessels. The ELIAS was, therefore, secured using 16 mooring lines in accordance with ARCO instructions, and care was taken not to use a damaged bollard. Figure 2 illustrates the terminal and berthing arrangement.

The Ports and Waterways Safety Act of 1972, PL 92-340 places the responsibility on the Coast Guard to protect navigable waters from environmental harm resulting from vessel or structure damage, destruction, or loss. In carrying out this responsibility, the Coast Guard may: control vessel traffic specifying times of entry, movement or departure to, from, within, or through ports, harbors, or other waters; direct the anchoring, mooring, or movement of a vessel when necessary to prevent damage to or by that vessel or her cargo; prescribe minimum safety equipment requirements to assure adequate protection from fire, explosion, and other serious accidents or casualties; establish water or waterfront safety zones for limited, controlled, or conditional access when necessary for the protection of any vessel, structure, waters, or shore area.

Environmental Information

Weather at the time of the accident was overcast with visibility about 10 miles. Air temperature was about 39°F with 75 percent humidity. Wind was northwesterly at force 2-3 (about 10 mph) moving across the ELIAS from the port bow toward the starboard quarter. Barometric pressure was at 1012 millibars. Water temperature was 50° F. Low water at Fort Mifflin was predicted at 2321, and the current was ebbing at an estimated 1.4 kns.

3/ NOAA Chart: Delaware River, Wilmington to Philadelphia, No. 12312.

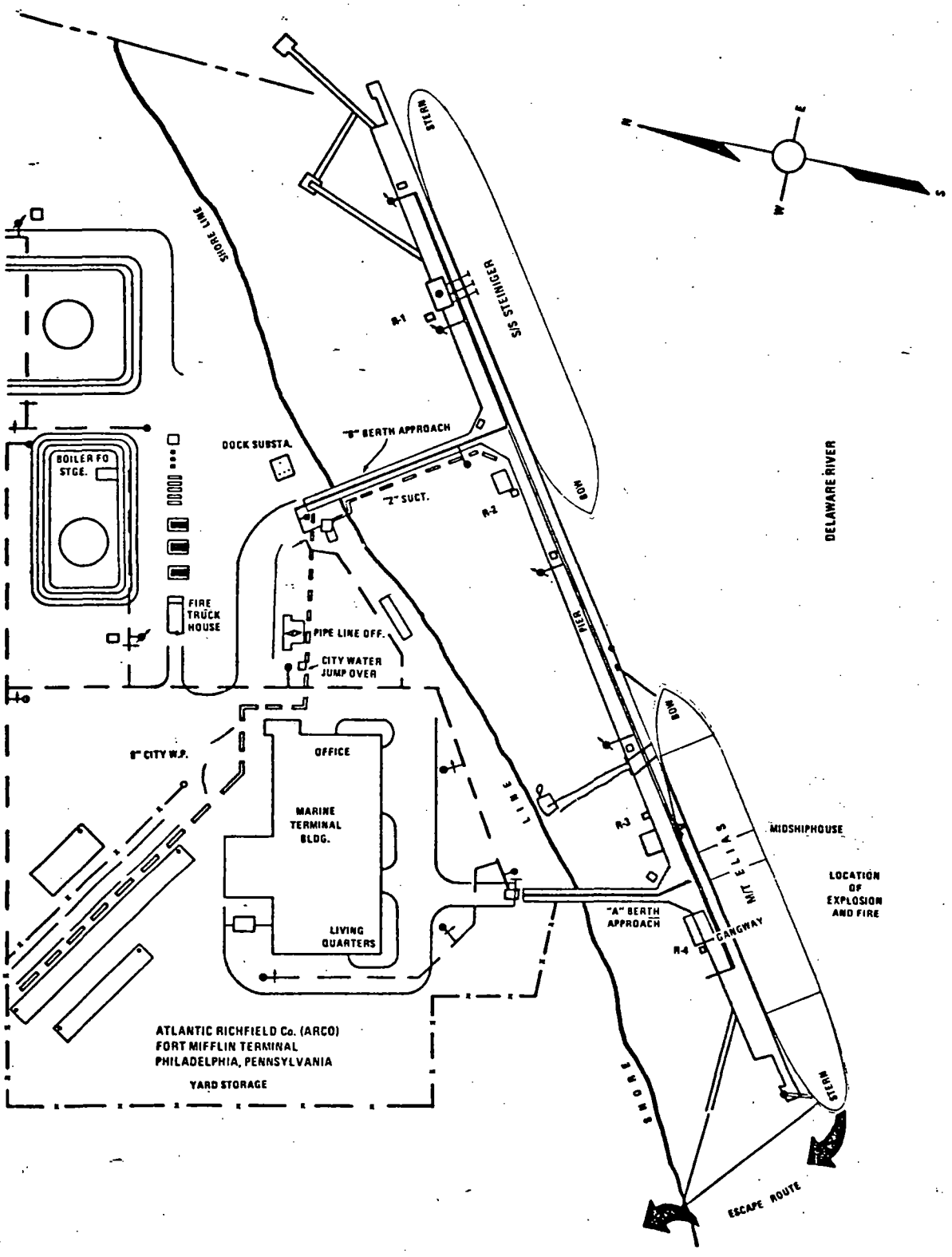

Figure 2. Terminal and berthing arrangement.

Wreckage

An underwater survey of the ELIAS was made by the U.S. Navy, Harbor Clearance Unit Two, from April 22-26, 1974. The survey was hampered by extensive wreckage which prevented access particularly in the forward areas. Water current and turbulence limited diving to periods of slack water.

This survey revealed the bow and stern sections of the ship were relatively intact, as were the port and starboard portions of the hull midbody for about 100 feet. Major explosion damage occurred in the forward cargo tanks Nos. 2 and 3 port, Nos. 2 through 5 center, and Nos. 2 through 4 starboard. The midshiphouse was wrecked, burned, and had settled into the cargo tank area below. The upper portion of the midshiphouse was visible above the water with sections of the forward main deck blown up and curled back over the top of the navigation bridge.

In the forward explosions, the ship's hull sides were blown outward and the deck upward; the three thwartship bulkheads bounding Nos. 2 and 3 cargo tanks were blown in a forward direction. The explosions aft, in cargo tanks Nos. 10 and 11 center, Nos. 5 and 6 port, and No. 6 starboard, appeared less severe; the port side hull at No. 6 tank was blown out over a 100-foot section while the starboard side of No. 6 tank was blown out over a 15-foot section.

The hulk of the ELIAS was subsequently cut into sections and barged to Aardvark Shipbreaking Corporation, Chester, Pennsylvania. Wreckage sections were demudded and cleaned to permit more detailed inspection of salvaged parts. This process took several months and revealed the following:

Significant burning had taken place in the midshiphouse smoking saloon and there was heavy charring of wood trim. All the forward glass portlights of the saloon were blown outward and remains of electric space heaters were found at deck level below the portlights. In the master's cabin, on the 02 deck level directly above the smoking and dining saloons, those bulkhead portions below the river waterline had not burned while all the areas above that line were severely burned.

There were wasted ventilation ducts outside the office (used as an emergency gear locker); underneath the 01 deck in portions of the segregation space of the deckhouse, and traveling through the pipe tunnel and laundry spaces. The lower seam in a vent elbow was wasted, having several 1-inch and smaller holes; this vent duct was a continuation of the forced air vent which began at 02 deck fan room coming down to the wasted elbow outside a locker on the 01 deck.

The two "avlopps-recess" void spaces below the midshiphouse main deck level, in No. 3 port and starboard cargo tanks, containing overboard

discharge sanitary system piping from heads and sinks in the midshiphouse, were wasted in the lower bulkhead and deck areas. The wastage consisted of holes from 1/2 inch to 1 inch in diameter with some holes larger. The starboard recess contained 8 to 10 such holes and the port recess twice that number. A small doubler plate patch repair had been made covering one of the holes. Adjacent bulkheads, deck, and waste piping to the water closet above the starboard recess all showed signs of deterioration. The bulkheads of the starboard recess were bulged out; the port recess showed some deformation, but to a lesser degree. Photographic evidence showed that at least one sink, in the midshiphouse, had no trap in its drain piping. Construction drawings of the ELIAS illustrated that several drains from equipment in the laundry room were designed not to include traps.

Examination of the main electrical switchboard indicated that electrical circuits for the laundry and forced ventilation system had been energized.

The port side of the after pumproom, wing tanks, and longitudinal bulkheads were relatively intact. The main deck over the port and starboard wing tanks were buckled. There was an indication that an explosion had occurred in the forward starboard corner of the pumproom and the corner appeared to have been blown out by considerable force. Both cargo pumps had apparently been operating. Upon disassembly, the starboard pump was found to contain 17 assorted nuts, bolts, and bushings in the discharge side which were believed to have been picked up in the cargo flow from the tanks. The forward pumproom showed no indication of an explosion having originated or occurred there.

The engineroom and engines showed no evidence of explosion or other major damage.

The last of ELIAS' wreckage was removed from berth "A" by November, and the inspection of salvaged sections was completed in December 1975.

Medical and Pathological Information

Autopsies performed by the office of the Medical Examiner, Department of Health, City of Philadelphia revealed most deaths resulted from fume inhalation and carbon dioxide poisoning, or suffocation by drowning. A detective agency employee assigned to watch detainees aboard the ELIAS was injured at his automobile parked about 300 feet from the ship and required hospitalization.

Explosion

Testimony of witnesses varied as to the time, location, number, sequence, and intensity of the explosions which destroyed the ELIAS. There were conflicting statements as to whether the first explosion

occurred forward of the midshiphouse or aft between the midshiphouse and afterhouse near the the gangway. A guard agency employee, in good position to view the whole ship, said he saw three men, who were smoking cigarettes, leave the ELIAS midshiphouse from an upper deck level, descend to the main deck, and walk toward the gangway just before the explosion. He also stated he heard a hissing sound prior to the first explosion, which was followed a few seconds later by another explosion; both were described as located aft. The source or nature of the hissing sound was not established. An ELIAS crewmember testified he heard a small thud, followed by an explosion and flash forward of the bridgehouse while he was seated at his desk in quarters in the afterhouse, facing toward the bow. Neither of these witnesses was looking directly at the deck of the ELIAS at the instant of the first explosion.

The captain of the STEINIGER, who was in his cabin, testified that the first explosion took place about 2140, and that he heard a big metallic sound at that time. Looking forward through the cabin porthole, he observed flames about the midshiphouse of the ELIAS; but after a second explosion, a short time later, the house disappeared and he saw only flames.

Testimony from other crewmembers of the ELIAS, STEINIGER, and ARCO terminal personnel in the vicinity, failed to establish precisely where the initial explosion occurred aboard the ELIAS. There was consensus as to two major explosions, with variations as to the number of subsequent, less violent explosions.

A pumpman aboard the tanker PUERTO RICAN, berthed across river about 1 mile from the ELIAS, testified he was looking in the direction of the ELIAS shortly before the explosion. He saw a line of flames, which appeared to be between the midshiphouse and afterhouse, and described the stem of a mushroom cloud explosion as emanating from the midshiphouse.

Pilots of two small aircraft landing at Philadelphia International Airport, in proximity and position to observe the ELIAS shortly before the explosion, described flames seen aboard the ship; in one case apparently on the forward deck and in the other on the afterdeck. The flames were described as Bunsen-like in structure with a yellow-orange glow. The ignition of the explosion was described as comparable to the lighting off of a cup of gasoline leading to the development of a mushroom-type ball of flame several hundred feet high. This testimony was given almost 3 years after the accident.

Fire

The explosions and ensuing fire aboard the ELIAS occurred in rapid succession about the midshiphouse, engulfing it in flames. Rupturing of the hull permitted flaming oil to spread away from the ship into the river and along the pier. The explosive nature of this accident made any on-board crew effort to fight the fire impossible.

The master of the STEINIGER, after hearing the explosion and seeing the fire aboard the ELIAS, mustered shipboard fire parties to prevent the spread of the fire to his ship. Flaming particles from the ELIAS rained down while a fire party on the forecastle sprayed water on the deck. Fearing that the fire would spread to his ship, the master then directed his crew to go ashore where they stayed for about 20 minutes. The crew returned aboard when tugs arrived to tow the STEINIGER to a safe anchorage.

Prompt action on the part of ARCO personnel in closing off cargo transfer systems prevented the spread of the fire into the terminal area. Assistance was provided to clear the STEINIGER from her dangerous berth.

The Philadelphia Fire Department responded rapidly to the fire alarm with land units and fireboats. The Coast Guard, the Navy, and passing commercial vessels also reacted quickly to the emergency in fighting the fire, assisting the STEINIGER away from her berth to a safe anchorage, containing the spread of burning oil, and searching for survivors. Some delay was encountered in fighting the fire from shoreside because the water service in the terminal area near the pier had been interrupted by the explosion blasts, and water had to be pumped from more distant sources.

There were minor communication delays in directing afloat units because the Philadelphia Fire Department boats were unable to use a common frequency radio channel with Coast Guard boats at the scene. Communications had to be relayed through a dispatcher located at the shore-based fire alarm room. Radio equipment which would have allowed direct communication with the Coast Guard was on order, but had not yet been delivered.

The fire was brought under control in about 1 1/2 hours and extinguished at 0315 on April 10.

Survival Aspects

None of the ELIAS crew located in the midshiphouse or on the main deck over the cargo tanks survived the explosion and fire. Crewmembers located in the afterhouse were able to escape by climbing down stern lines and dropping into the water, or by jumping off the poopdeck, and swimming ashore. There was barely enough time for swimmers to reach the shore ahead of flaming waterborne oil and debris. Escape over the pier was blocked by fire alongside the ELIAS. No attempt was made to use lifeboats or lifesaving devices other than lifejackets in escaping from the ELIAS.

During the afternoon of April 9, the master of the ELIAS had gone ashore to the ARCO guardhouse to sign a pass permitting several of his

relatives to pass through the ARCO terminal and visit aboard the ELIAS. The master and his guests perished in the midshiphouse when the ELIAS blew up.

The Code of Federal Regulations (46 CFR 35.30-1(b)) provides that a sign shall be displayed at the gangway of tanker vessels to warn persons approaching the gangway, while a vessel is moored or anchored, unless it is gas-freed. The sign shall state in letters not less than 2 inches high substantially as follows:

WARNING

No open lights
No smoking
No visitors

The ELIAS had the above warning posted at the gangway.

Additional Information

ARCO Terminal Berths.--Berths "A" and "B" at the ARCO terminal had been damaged by the S/S CHRYSANTHY on April 5, 1974. A survey of the collision damage was made on April 8 by ARCO management personnel and local consulting engineers. Pier structural damage was estimated to be about $200,000, but the berths were considered safe for ships and cargo transfer. This damage was not reported to the Coast Guard and there was no requirement to do so. Acting on a report that No. 3 rectifier, part of the pier's electrical cathodic protection installation, was showing no reading, the ARCO Assistant Corrosion Engineer inspected the unit about 1330, found it was malfunctioning, and shut off the AC power supply; his inspection was independent from that of the pier damage survey group. While not initially associated with damage caused by the CHRYSANTHY, electrical damage of the cathodic protection system, if any, might not have been detected during the pier survey. The section of Berth "A" served by No. 3 rectifier bordered that portion of the ELIAS from the midshiphouse forward in its berthed position. Three other rectifiers, which were not deactivated, served the pier including No. 4 covering the remaining section of berth, and Nos. 1 and 2, located at berth "B."

An ARCO dockman coordinated terminal cargo operations with the ELIAS. He tended the shoreside hose crane rig, making hose adjustments to compensate for the tide, ship draft changes, and vessel surging due to waves caused by river traffic. About 2100 the dockman boarded the ELIAS to ask the chief mate when the ship would complete discharge and was told it would be about 0200 on April 10. He then returned to the crane control booth where he received a telephone call directing him to pick up water receipts at the guardhouse which required the chief mate's signature. He left the rig about 2130 and was at the guardhouse when the explosion occurred.

ANALYSIS

Explosions and Fire

Crude oil is a generic designation given to various unrefined liquid hydrocarbon mixtures. The volatile fractions of crude oil vaporize readily, and when combined with sufficient quantities of oxygen form a flammable mixture. In general, the flammable range of hydrocarbon/oxygen concentration is between 1 and 11 percent hydrocarbons combined with at least 11 percent oxygen by volume. Hydrocarbons and oxygen do not readily form a homogenous mixture; therefore, the probability of pockets of flammable vapors within a cargo tank containing crude oil residues is high. When a flammable mixture burns, the oxidized gases expand rapidly. The expansion of the burning gases within a cargo tank is constricted, and results in a pressure rise that can rupture the tank. Only elimination of all ignition sources or exclusion of ambient oxygen will mitigate internal cargo tank fires and explosions.

The exclusion of oxygen from cargo tanks is called "inerting." Usually, a gas which cannot support combustion is admitted into the cargo tanks to displace ambient air which contains oxygen. A cargo tank which is inerted cannot sustain an internal fire and explosion if the tank boundaries are not breached. Recently, the installation of inert gas systems on new tankships carrying crude oil has gained wide acceptance. The ELIAS was not fitted with an inert gas system, nor was it required to be.

On tankships built without inerting, such as the ELIAS, the elimination of ignition sources in and around cargo tanks was the only practical means of mitigating the chance of internal fires and explosions. Under certain conditions, flammable vapors released from cargo tank openings can travel considerable distances and then be ignited. From the ignition source, the flame front can propagate back to the cargo tank. To prevent the remote ignition of flammable vapors from propagating back into a cargo tank, all openings are minimized and fitted with flame control devices, i.e., flame arrestors or screens. The Coast Guard inspection team found three flame screens missing on the ELIAS before the accident, but this discrepancy was immediately corrected. However, during discharge ullage screens are routinely removed to measure the remaining cargo. Hydrocarbon/oxygen flames may propagate into a cargo tank through holes as small as 1/20 of an inch. Therefore, small openings caused by wastage or poorly fitted closures compromise the effectiveness of flame control devices. The frequency of fires and explosions in tanks, as in the ELIAS case, demonstrates that the emphasis on elimination of ignition sources has not been completely effective.

Crude oil vapors, traveling considerable distances from a tank may be "flashed" or readily ignited by sparks from electric lamps, fixtures, electric tools, and appliances, which are not explosionproof, and also

from sparking of short circuits or grounds in defective electric wiring. In rare cases, ignition may occur from discharge sparks caused by static electricity or by lightning.

The following available sources of ignition on or about the ELIAS were considered:

1. The gyrocompass elements and associated equipment, which were not explosionproof. Sparks from these could have ignited vapors that penetrated into the midshiphouse. A flame front initiated in this compartment could have propagated back to the cargo tank(s).

2. Laundry room equipment, which was supposed to have been deactivated. The inspection of demudded parts showed that the fuse panel for the laundry and forced ventilation system may have been energized. Activating any of this equipment could have ignited vapors, initiating the accident.

3. The energizing of heating elements in electrical space heaters, a toaster, coffee plate, or other similar appliances, located in the midshiphouse pantry, saloon, or accommodations.

4. Sparks from short circuits or grounds in faulty wiring or deteriorated wiring insulation within the midshiphouse. The surveys conducted in 1973 indicate the poor condition of wiring on the ship. There is no evidence of any effort by the crew to upgrade the ELIAS' electrical installations. The electrical system in the midshiphouse storage area probably was affected by the 32 inches of salt water which accumulated in the area when the April 7 fire was extinguished.

5. Lighting of cigarettes or other smoking items.

6. Sparking by electrical equipment associated with the refrigeration compressor unit, located in the room adjacent to that of the gyrocompass.

7. Spontaneous combustion. Some materials when damp or soaked in oil can ignite without the application of flame when heat is produced during oxidation. The unexplained midshiphouse fire at sea on April 7 could have originated from this. The Coast Guard inspecting officer noted that the main deck felt warm due to cargo heating about 8 hours before the fire on April 9. An oily rag exposed to the warm deck could have ignited and caused either fire.

8. Auto-ignition. This is discounted as a potential source because a temperature of 500° F would have been required to ignite hydrocarbon vapors. Only about 300° F could have been developed in the steam heating coils. Furthermore, hydrocarbon vapors must remain in contact with the heat source for several seconds, and because of convection, it is unlikely that this could have occurred in the cargo tanks.

9. Static electricity produced by leaking steam heating coils. However, the interior of the tanks were coated with crude oil which, according to research, has excellent electrical insulation qualities. Therefore, the probability of sparking due to static electricity is unlikely.

10. Sparking of an electrical lighting, control or communication system at berth "A". These systems could have been damaged on April 5 by the CHRYSANTHY. However, the nature of the explosions within the hull of the ELIAS would discount these as ignition sources in this instance.

From the testimony it is estimated that 87 percent of the ELIAS cargo had been discharged when the explosion occurred; leaving about 27,000 barrels of crude oil aboard. The volume of the ELIAS cargo tanks totalled 1.4 million cubic feet. At the time of the explosion therefore, the space containing concentrations of hydrocarbon vapors amounted to 1.2 million cubic feet. The three sample tanks gauged at the start of cargo discharge indicated cargo temperatures between 125° and 135° F, and there was no evidence of heating coils being shut off during the unloading. Heating the cargo raised the initial pressure within the tanks by accelerating the generation of hydrocarbon vapors and their expansion. At the time of the explosion, some portion of most of the cargo tanks in the ELIAS was in the explosive range.

The underwater survey made shortly after the ELIAS sank at berth "A," and a later inspection of demudded sections and parts of the ship revealed that the explosions occurred within the cargo tanks. The nature of the damage indicates a heavy explosion originated in the hull below the midshiphouse and initiated a series of tank explosions that progressed forward, as evidenced by the direction of the cargo tank bulkhead distortions; lesser explosive damage occurred in Nos. 10 and 11 centerline tanks, and in the after pumproom.

The salvage inspection also revealed wasted metal and holes in the "avlopps-recess" spaces, sanitary piping, and ventilation ducting within the midshiphouse structure. The midshiphouse sanitary system passed through the "avlopps-recess" spaces which were contained within No. 3 cargo wing tanks, port and starboard. The metal wastage in the "avlopps-recess" spaces and the sanitary piping, coupled with missing sanitary

traps, could have allowed cargo vapors from No. 3 wing tanks to enter the sanitary piping system serving the midshiphouse. The laundry room, located above No. 5 center tank, was elevated above the main deck leaving a void space which also permitted sanitary lines from the laundry to pass through the "avlopps-recess" spaces. This void and the "avlopps-recess" spaces were difficult to inspect and maintain and were excellent areas for rusting and metal wastage to develop undetected.

Considering the deteriorated material conditions which existed on the ELIAS because of poor maintenance, and the potentially explosive conditions in the cargo tanks at the time of the accident, the Safety Board concluded that heated, flammable, crude oil vapors, expanding from the tanks below the midshiphouse, entered the accommodations through the "avlopps-recesses" and the interconnected sanitary systems. The vapors then were ignited by an unknown ignition source in the compartments and propagated back into the cargo tanks, initiating a series of explosions.

Ship Maintenance and Operation

The loss of the master and deck officers of the ELIAS left many unanswered questions concerning cargo operations, cargo tank conditions, and ship maintenance generally. Testimony and evidence revealed that the cargo tanks were poorly maintained and not regularly inspected. There was no indication that any effort was made to correct cited electrical deficiencies, using the ship's crew. An 18-year-old tanker requires considerable hull and electrical maintenance.

A ship's deck logbook normally contains accurate and pertinent information concerning environmental data, ship operations, and other significant shipboard activities. Entries are routinely made during the course of a watch and signed by the deck officer upon the change of watch. No entries, however, were recorded in the ELIAS logbook about the fire at sea on April 7, and no events were recorded after midnight of April 6 through the time of the accident on April 9, according to a Federal Bureau of Investigation report on the recovered logbook. The reason for this lack of entries remains unexplained.

Tanker Boarding and Examination

Subsequent to the ELIAS accident and because of a series of oil tanker accidents in and near American waters, the President, in his letter to Congress of March 17, 1977, proposed that the Secretary of Transportation develop new rules for tanker standards, applicable to U.S. and foreign vessels calling of American ports. Also included was a requirement that the U.S. Coast Guard board and examine each foreign flag tanker at least once a year, and more often if necessary, to insure that such vessels meet all safety and environmental protection regulations. There is a need for the Coast Guard to make public specific policy concerning vessel examination.

Survival Aspects

Escape from the midshiphouse accommodations of the ELIAS, located over the exploding cargo tanks, was impossible. As in similar tanker accidents, individuals located in the afterhouse were able to escape by climbing down mooring lines and dropping into the water, or by jumping off the poopdeck, and swimming ashore. In this instance, the shoreline was suitable for rapid egress from the water and swimmers had time to get there before waterborne flaming oil and debris closed that route. Such favorable shoreline conditions do not exist at all terminals, however. Escape over the pier was impossible as the causeway from berth "A" to the terminal was blocked by the fire. Had the ELIAS been berthed starboard side to, escape via berth "B" would have been possible.

No effort was made to use the lifeboat aft. Had there been time to launch boats, survival in the open-type boats carried by the ELIAS would have been doubtful. This accident, as in the case of the QUEENY CORINTHOS 4/ reemphasizes the need for an enclosed, firesafe lifeboat or comparable equipment to save lives under these conditions.

Had the ARCO dockman coordinating terminal cargo operations remained at his control station close to the gangway and cargo manifold, he would undoubtedly have been another victim of this accident.

A gangway should provide safe and rapid exit from ship to shore. The gangway to the ELIAS was positioned on the main deck, port side amidships, near the cargo manifold. (See figure 2.) This location, while efficient for cargo operations, requires that personnel from the midshiphouse and afterhouse proceed over the tankdeck when boarding or departing the ship. A gangway located at the midshiphouse would have been destroyed in any event. A suitable gangway from the afterhouse to the pier, assuming the pier itself provided a safe escape route, would have eliminated the need for the crew to swim ashore. There is a need for thorough review of safe rapid passage for crew and passengers between ship and shore, particularly where terminal piers place ship berthing at considerable distance from the shoreline.

The danger of placing accommodations over cargo tanks is recognized. Coast Guard tank vessel regulations (46 CFR 32.56) prohibit the locating of accommodations over cargo areas on tankships with keels laid on or after January 1, 1975. A similar restriction is placed on navigation positions, with consideration given to safe navigation and operation of the vessel. These regulations incorporate, in substance, Intergovernmental Maritime Consultative Organization (IMCO) Resolution A 271 (VIII), adopted on November 20, 1973. Because a number of tank vessels built with midshiphouses before these regulations took effect will continue to

4/ "Marine Accident Report--SS EDGAR M. QUEENY Collision with the Liberian S/T CORINTHOS, Marcus Hook, Pennsylvania, 31 January 1975," (USCG/NTSB-MAR-77-2).

operate for many years, the hazards associated with these vessels will remain and special precautions should be taken to avoid the recurrence of a similar accident.

Port and Waterway Terminals

Although berths "A" and "B" at the ARCO terminal had sustained $200,000 damage just 3 days before the ELIAS and STEINIGER were to berth for discharge, no report was made to the Coast Guard as it was not required. For similar reasons, apparently, the ELIAS' agent was not notified. Further, a thorough survey of pier damage was not made until the morning when the ELIAS arrived.

Owners of artificial islands and fixed structures on the outer continental shelf, and licensees of deepwater ports, as regulated under 33 CFR, Subchapters N and NN respectively, are required to submit reports to the Coast Guard, Officer-in-Charge of Marine Inspection, if any component of the port is hit by a vessel and damage to property is in excess of $1,500. No similar requirement is imposed on the owner of a "designated waterfront facility," such as the Fort Mifflin terminal, located along U.S. waterways. Consequently, the $200,000 damage was not reported.

There is a striking resemblance to a man-made artificial island in the Fort Mifflin terminal pier design, joined to the mainland by causeways. (See figure 2.) Numerous similar terminals exist along the U.S. waterways and many are in close proximity to cities and industrial centers. An accident, therefore, could have more disastrous effects in such an area than might occur at continental shelf or deepwater port facilities.

The destruction of firefighting services which occurred at the Fort Mifflin terminal reveals a problem in pier and causeway layout which requires attention. Causeways generally concentrate traffic and services along the same route to a pier. Damage to a causeway may therefore leave the pier isolated with little or no means to fight or control fire. In this accident, firefighting support was rapidly provided by the Coast Guard, Navy, and local firefighting boats while additional water resources were obtained from distant terminal locations. Such standby waterborne equipment does not exist, however, in such proximity to many U.S. waterway terminals.

Communications

This accident highlights a lack of communications coordination among Coast Guard commands and terminal managers, shipping agents, and ship operators relative to potential ship and terminal hazards.

The distress message from the ELIAS to CCGD FIVE, on April 7, was cancelled 30 minutes after it was sent. As there was no need for CCGD FIVE to provide assistance, the fire incident was not investigated

further at that time. No action was taken by the Coast Guard to inspect the ELIAS upon arrival, and the ship was allowed to proceed 87 miles up the Delaware River to berth at the ARCO terminal. Although the ELIAS posed a potential hazard to the port at this time, neither the ARCO terminal management, nor the ship's agent was contacted by the Coast Guard, and there is no indication that the pilot station was contacted concerning any special precautions to take in handling the ship's arrival into the Philadelphia port area.

It was 22 hours after berthing and 19 hours after commencing discharge, or about 30 hours after arrival in U.S. waters, before the Coast Guard officer from MIO PHILA boarded the ELIAS to investigate the reported fire at sea. The Coast Guard boarding team arrived shortly thereafter to conduct a routine tanker inspection. The investigating officer viewed the fire damage and filed a report but did not determine the cause of the April 7 fire. The boarding team did not inspect the fire damage. Neither the investigating officer nor the boarding team found any reason to stop the ELIAS discharge. The investigation was accomplished in less than an hour while the boarding team completed its checklist in 35 minutes. Considering that the cause of the fire at sea remained unknown with the possibility of recurrence, a more thorough investigation and inspection should have been made at that time.

In this instance, had the ELIAS' Philadelphia agent been notified of the extent of damage to the Fort Mifflin pier, he could have requested another berth assignment for the ship. Conversely, had the ARCO management been made aware of the fire aboard the ELIAS prior to its arrival, they might have required the ship to be inspected before accepting it at the terminal. The lack of such communications, however, precluded the exercise of the foregoing options. A safety zone could have been used for ship inspection. Further, the terminal manager and the ELIAS' agent would probably have questioned the Coast Guard message reference to "hold on fire" and "Bunker C" cargo on the tanker ELIAS.

Visitors on Tankers

The value and effectiveness of posting the warning sign required under 46 CFR 35.30-1(b) is questionable. This sign is to be displayed while a vessel is moored or anchored unless it is empty and gas-freed. In this instance, four visitors (guests of the master) were passed through the terminal and brought aboard the ELIAS. While the master should have been aware of the potential shipboard dangers it is doubtful that his guests were, and whether he advised them is unknown. There is a need for clarification of the purpose of the sign, and more stringent control of visitors through terminals and their boarding of vessels that are not gas-freed. While certain visitors may need to be authorized to conduct their business aboard tankers, much of such activity might be conducted more safely at the terminal. Visitors who need to board tankers should be advised more formally of precautions to be observed and of the hazards on board.

CONCLUSIONS

Findings

1. The Coast Guard, while aware of the fire aboard the ELIAS on April 7 made no effort to develop detailed information as to the nature, extent, or seriousness of the shipboard fire or to determine, before the ship arrived, whether it might pose a potential threat in a harbor or waterway.

2. The Coast Guard took no action to anchor or moor the ELIAS at a safety zone, pending investigation of the fire at sea, before allowing the ship to proceed to its berth at Fort Mifflin.

3. There was an inordinate delay in boarding the ELIAS to investigate the fire at sea, after the ship arrived.

4. Although three Coast Guard personnel boarded the ELIAS after berthing, only the MIO investigating officer surveyed the damage that resulted from the fire at sea. The boarding team was not fully utilized in an effort to determine the cause of the fire.

5. The Coast Guard made no effort to inform either the ELIAS' Philadelphia agent or ARCO terminal management about the ship's reported fire on April 7.

6. Existing regulations do not require that terminal managers of "designated waterfront facilities" report casualties and accidents, which may affect safe berthing of vessels, to the Coast Guard.

7. Fewer persons would have been killed in the explosion if all accommodations on the ELIAS had been located aft.

8. The posting of a warning sign, as prescribed in 46 CFR Part 35.30-1(b), does not alert visitors that they may be endangering their lives by boarding tankers that are not gas-free or inerted.

9. Survivors were forced to jump off the stern of the ELIAS and swim ashore because there was no gangway or other safe method rapid escape from the stern to the pier, or directly to the shore terminal. Escape across the pier to the terminal was blocked by the explosion and fire, and the port-side berthing of the ELIAS further complicated the problem.

10. Lifeboats could not be used to escape from the ELIAS because of the time required to launch them from their cradled positions; the boats were not designed to endure a waterborne oil fire.

11. The installation of the gyrocompass, laundry equipment, and other ignition sources in the midshiphouse above the cargo tanks represented poor design practice. The installation of sanitary and ventilation systems which served as conduits for flammable vapors added to the hazard.

12. The installation of the "avlopps-recess" spaces into the cargo tank revealed poor design practice. Metal wastage can go undetected in such spaces and allow flammable vapors to escape from cargo tanks and enter into accommodation spaces where ignition can occur.

13. Metal wastage and holes in the cargo tank boundaries and in the sanitary systems of the ELIAS occurred in locations where repairs were difficult and dangerous to accomplish through shipboard maintenance.

14. Metal wastage in voids that are difficult to enter create problems in carrying out an effective shipboard inspection program.

15. The deck logbook on the ELIAS was not properly maintained.

16. The terminal firefighting installation was inadequately protected from blast and fire damage and failed to perform in the emergency.

17. Communications coordination during the firefighting and lifesaving effort was hampered because of the lack of a common radio communication frequency which could be used among the Coast Guard, Navy, and local fireboats and commercial craft.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the inadequate maintenance of cargo tanks and the sanitary system which allowed volatile cargo vapors to enter compartments containing ignition sources. The location of accommodations over cargo tanks contributed to the loss of life.

RECOMMENDATIONS

As a result of its investigation of this accident, the National Transportation Safety Board recommended that the U.S. Coast Guard:

"Implement communications practices to insure that pilots, ship operating agents, terminal operators, and port firefighting authorities are informed of potentially hazardous ship movements. (Class II, Priority Action) (M-78-35)

"Improve the promptness and effectiveness of boarding programs and special investigative procedures on tank vessels, and review the adequacy of checklists to aid in the detection of potentially hazardous shipboard conditions. (Class II, Priority Action) (M-78-36)

"In the implementation of the Marine Safety Information System (MSIS) and Port Safety Reporting System (PSRS), incorporate information on ship safety deficiencies obtained from foreign inspection sources and also from local activities responsible for ship operations, to insure effective control of such ships. (Class II, Priority Action) (M-78-37)

"Establish a plan review program relative to new construction of new port terminals that evaluates the protection of firefighting systems, to minimize damage or loss resulting from explosion and to insure availability and effectiveness for firefighting. (Class III, Longer Term Action) (M-78-38)

"Study the positioning of shipborne gangways and shoreplaced brows to determine ways to provide for rapid personnel escape from vessels during emergencies. (Class II, Priority Action) (M-78-39)

"Promulgate regulations that control visitor movement through terminals and restrict their boarding of tankers that are not gas-free or inerted. (Class II, Priority Action) (M-78-40)

"Study the feasibility of providing safer means of escape from tankers across piers to safe terminal locations, to improve chances of survival for shipboard personnel when lifeboats cannot be used and swimming ashore is not possible. (Class III, Longer Term Action) (M-78-41)

"Modify regulations governing "designated waterfront facilities," to require reporting of casualties and accidents to the Coast Guard, conforming to those specified for deep water ports and artificial islands. (Class II, Priority Action) (M-78-42)

"Make public specific policy concerning the frequency of boarding, and the extent of examination to be made, of foreign tank vessels calling at American ports, to insure that such vessels meet U.S. safety and environmental protection regulations, as proposed in the President's message to Congress on March 17, 1977. (Class II, Priority Action) (M-78-43)

"Require expeditious and thorough investigation of arriving tank vessels that might pose a threat to U.S. ports and waterways because of an on-board fire or casualty, at safety zones before permitting berthing in U.S. ports. (Class II, Priority Action) (M-78-44)"

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JAMES B. KING
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ PHILIP A. HOGUE
Member

/s/ ELWOOD T. DRIVER
Member

May 17, 1978

APPENDIX

VESSEL DATA

Name:	ELIAS (Ex. HILDA KNUDSEN)
Official Number	4849
Home Port	Piraeus, Greece
Gross Tons	19,178
Net Tons	11,238
Deadweight Tons	31,830
Length	649 feet 10 inches
Breadth	82 feet
Depth	46 feet 3 inches
Propulsion	Diesel (Twin Screw)
Horsepower	10,800
Class, Society	Germanischer Lloyd (August 1973)
Last Inspection	SOLAS Safety Equipment, February 1973
	SOLAS Safety Construction, February 1973
Owner:	Lidoriki Maritime Corp., Piraeus, Greece
Operator	Eletson Maritime, Inc., Piraeus, Greece
Agent	Charles Kurz Co., 115 Chestnut Street Philadelphia, Pa.
Master	Andrea Antoniadis
Crew:	34 (including master)
Built:	1956
Builder:	Aktiebolaget Gotaverken Gothenberg, Sweden

Inter-Office Communication

ORIGINAL

Date: February 23, 1977

To: H. J. Russell - AP-4171 - Los Angeles

From: John T. Updegraff - Independence

Subject: ARCO Pipe Line Company Damage Claim to Fort Mifflin Dock Resulting from the Explosion of the Elias.

Reference is made to your letter of February 8, 1977, to Mr. David Rosenbaum which, in addition to other information, requested copies of bills paid by ARCO Pipe Line Company for voluntary cleanup expenses totaling $245,668.81. It is my understanding that this amount has now been reduced to $241,438.21 as evidenced by the vouchers listed in Mr. H. H. Baden's letter to me dated February 18, 1977.

Enclosed is a copy of the invoices or bills supporting cleanup costs in the amount of $241,438.21.

JTU:mv
Enclosures

cc: E. J. Kettel w/copy of invoices
W. J. Craig
A. R. Steel w/copy of invoices
H. N. Williams
D. R. Rosenbaum
Theo L. Polasek
W. A. Schaid
H. H. Baden

Date: February 18, 1977

To: J. T. Updegraff

From: H. H. Baden

Subject: ARCO Pipe Line Company - Clean-up Costs of $241,438.21
Result of Explosion of Vessel M/T ELIAS - April 9, 1974

The following information is provided for your further handling in response to the letter from H. J. Russell to D. E. Rosenbaum dated February 8, 1977, requesting copies of bills to support the above subject clean-up costs. It is understood the attached data will be used in putting together a claim against Oil Insurance, Ltd..

Attachment Sheet No.	Check No.	Date	Voucher No.	Vendor	Item	Amount
1	10232	6-21-74	F1859-74	Clean Water, Inc.	Pollution Control Operations	$100,000.00
2 thru 9	11301	7-09-74	G1051-74	Coastal Services	Boom Off "Elias" and Clean Up Oil	50,162.47
10 thru 22	11302	7-09-74	G1052-74	Clean Water, Inc.	Pollution Control	52,889.01
23 thru 29					Operations	40,507.98
30 thru 32	14957	9-04-74	H2196-74	Phila. Naval Ship Yard	Clean up #4 Fuel Oil	2,109.35
					Sub Total	$245,668.81
	Less Refunds for Overcharges - K388-74					
33 and 34		9-12-74	X352-74	Clean Water, Inc.		2,788.35
35		9-03-74	X336-74	Clean Water, Inc.		1,442.25
					Total	$241,438.21

Please let us know if you need additional information.

H. H. Baden

HHB:lu

Attach. (5 sets attached)

cc: T. L. Polasek - w/o attachment
A. R. Steel - " "
J. D. Wessling - " "
W. A. Schaid - " "

ARCO Pipe Line Company | Check Request

Please issue check to:

CBI ORIGINAL

Clean Water, Incorporated
Court House Square
P.O. Box 1002
Toms River, New Jersey 08753

Description	Amount
Partial payment on invoice 3111-3, dated May 21, 1974 re: pollution control operations at the ARCO Pipe Company Fort Mifflin Terminal	$100,000.00

INDEXED JUN 21 1974

Cost center | ☐ Budget item | ☐ Nonbudget item | Charge

Send check for transmittal to: C. T. Carter | Location no. | Auth. | S.E. | U.D. 74

Requested by: K. A. Baden | Date requested 6/21/74

Approved by: C. T. Carter | Date approved 6/21/74

ARPL-159-B

D4 (6) Acc.

(1)

Telephone: (617) 848-4820

COASTAL SERVICES

Oil Pollution Control -- Tank Maintenance

OK to handle as original invoice

Kobade

ORIGINAL

Please remit to: 22 River Street
Braintree, Massachusetts 02184

Date: May 30, 1974

RECEIVED
JUN 7 1974
S. C. WEBER

Invoice No. 2895

TO: ARCO Pipeline Company
Fort Mifflin Terminal
Philadelphia, Penn.

Job No. P-8048-4-74

Your P.O. No. Verbal

Terms: ½ of 1% 10 days
Net 30

JOB DESCRIPTION

Services rendered, labor, equipment and material furnished to boom off the vessel "Elias" and to clean up oil from various areas as noted: Arco Dock, Ft. Mifflin, B.P. Terminal, Mantua Terminal and Coastal dock. All charges are on a time and material basis as per the attached work sheets:

Total Invoice --------------------------------------$50,162.47

APPROVED: S. C. Weber

EXTENSION 2 OK

UD-74
Kobade

INDEXED JUL 5 1974

(2)

CBI ORIGINAL

WEDNESDAY, APRIL 10, 1974 - Ft. Mifflin - Arco Dock

LABOR:	3 Supvs. 18 ea	25½ hrs @ 12.50/hr	318.75	
		28½ hrs @ 18.75/hr	534.38	
	1 Supv. 19 hrs	8½ hrs @ 12.50/hr	106.25	
		10½ hrs @ 18.75/hr	196.88	
	3 Cleaners 20 ea	25½ hrs @ 9.00/hr	229.50	
		34½ hrs @ 13.50/hr	465.75	
	3 Cleaners 14 ea	16½ hrs @ 9.00/hr	148.50	
		25½ hrs @ 13.50/hr	344.25	2,344.26
SUBSISTENCE:	3 men @ 25.00/day each			75.00
EQUIPMENT:	1600' - 36" boom @ 1.50/ft/week		2,400.00	
	1 Vacuum barge	18 hrs @ 75.00/hr	1,350.00	
	2 Power Work Boats 22 ea - 44 @ 25.00		1,100.00	
	1 Towboat (see River Assoc. Inv.)			
	1 LCM	23 hrs @ 55.00/hr	1,265.00	
	2 Utility trucks @ 22.50/day each		45.00	
	1 Small boat w/motor @ 25.00/day		25.00	6,185.00
MATERIAL:	See expendables on last sheet			
TOTAL - WEDNESDAY - APRIL 10, 1974 ----------				$8,604.26

WEDNESDAY, APRIL 10, 1974 - B P Area & Coastal Dock

LABOR:	1 Supv. 17 hrs	8½ hrs @ 12.50/hr	106.25	
		8½ hrs @ 18.75/hr	159.38	
	2 Cleaners 17 ea	17 hrs @ 9.00/hr	153.00	
		17 hrs @ 13.50/hr	229.50	
	1 Cleaner 13 hrs	8½ hrs @ 9.00/hr	76.50	
		4½ hrs @ 13.50/hr	60.75	
	5 Cleaners 18 ea	42½ hrs @ 9.00/hr	382.50	
		47½ hrs @ 13.50/hr	641.25	1,809.13
SUBSISTENCE:	8 men @ 25.00/day each			200.00
MATERIAL:	See expendables on last sheet			
EQUIPMENT:	2 Front End Loaders (Jennings)			
	1 Hertz van @ 22.50/day			22.50
TOTAL - WEDNESDAY - APRIL 10, 1974 ----------				$2,031.63

WEDNESDAY, APRIL 10, 1974 - Mantua Terminal Beach (North)

LABOR:	1 Supv. 19 hrs	8½ hrs @ 12.50/hr	106.25	
		10½ hrs @ 18.75/hr	196.88	
	1 Cleaner 14 hrs	8½ hrs @ 9.00/hr	76.50	
		5½ hrs @ 13.50/hr	74.25	
	3 Cleaners 12 ea	25½ hrs @ 9.00/hr	229.50	
		10½ hrs @ 13.50/hr	141.75	825.13
EQUIPMENT:	1 Utility truck @ 22.50/day			22.50
TOTAL - WEDNESDAY - APRIL 10, 1974 ----------				$ 847.63

CBI ORIGINAL

WEDNESDAY, APRIL 10, 1974 Coastal Dock & Beach

LABOR:	1 Supervisor 18 hrs	8½ hrs @ 12.50/hr	106.25	
		9½ hrs @ 18.75/hr	178.13	
	4 Cleaners 8 ea	18 hrs @ 9.00/hr	162.00	
		14 hrs @ 13.50/hr	189.00	
	1 Cleaner 7 hrs	3½ hrs @ 9.00/hr	31.50	
		3½ hrs @ 13.50/hr	47.25	
	1 Cleaner 14 hrs	8½ hrs @ 9.00/hr	76.50	
		5½ hrs @ 13.50/hr	74.25	864.88
SUBSISTENCE:	1 man @ 25.00/day			25.00
EQUIPMENT.	1 Front End Loader (Derr & Son - see last sheet)			
TOTAL - WEDNESDAY - APRIL 10, 1974 ----------				$889.88

WEDNESDAY, APRIL 10, 1974 - Coastal Dock

LABOR:	2 Supvs. 19 ea	17 hrs @ 12.50/hr	212.50	
		21 hrs @ 18.75/hr	393.75	
	2 Supvs. 8 ea	9 hrs @ 12.50/hr	112.50	
		7 hrs @ 18.75/hr	131.25	
	1 Supv. 11 hrs	7½ hrs @ 12.50/hr	93.75	
		3½ hrs @ 18.75/hr	65.63	
	3 Cleaners 19 ea	25½ hrs @ 9.00/hr	229.50	
		31½ hrs @ 13.50/hr	425.25	
	1 Cleaner	6 hrs @ 13.50/hr	81.00	
	3 Cleaners 20 ea	25½ hrs @ 9.00/hr	229.50	
		34½ hrs @ 13.50/hr	465.75	
	4 Cleaners 12 ea	34 hrs @9.00/hr	306.00	
		14 hrs @ 13.50/hr	189.00	
	6 Cleaners 8 ea	27 hrs @ 9.00/hr	243.00	
		21 hrs @ 13.50/hr	283.50	
	3 Cleaners 13 ea	25½ hrs @ 9.00/hr	229.50	
		13½ hrs @ 13.50/hr	182.25	3,873.63
SUBSISTENCE:	16 men @ 25.00/day each			400.00
EQUIPMENT:	1 Small boat w/motor @ 25.00/day		25.00	
	2 Automobiles @ 22.50/day each		45.00	
	1 Small Hertz van @ 22.50/day		22.50	
	2 Utility trucks @ 22.50/day each		45.00	137.50
TOTAL - WEDNESDAY - APRIL 10, 1974 ----------				$4,411.13

CBI ORIGINAL

THURSDAY, APRIL 11, 1974 Arco Dock "B"

LABOR:	1 Supv.	7 hrs @ 18.75/hr	131.25	
	1 Cleaner	7 hrs @ 13.50/hr	94.50	225.75
SUBSISTENCE:	2 men @ 25.00/day each			50.00
EQUIPMENT:	1 Utility truck @ 22.50/day		22.50	
	1 Power Work Boat	7 hrs @ 25.00/hr	175.00	
	1 LCM	7 hrs @ 55.00/hr	385.00	582.50
TOTAL - THURSDAY - APRIL 11, 1974 ----------				$858.25

THURSDAY, APRIL 11, 1974 - B P Beach

LABOR:	1 Supv. 12 hrs	8½ hrs @ 12.50/hr	106.25	
		3½ hrs @ 18.75/hr	65.63	
	1 Cleaner 14 hrs	8½ hrs @ 9.00/hr	76.50	
		5½ hrs @ 13.50/hr	74.25	
	2 Cleaners 11 ea	17 hrs @ 9.00/hr	153.00	
		5 hrs @ 13.50/hr	67.50	543.13
SUBSISTENCE:	4 men @ 25.00/day each			100.00
MATERIAL:	See expendables on last sheet			
EQUIPMENT:	3 Front End Loaders (Jennings)			
	1 Utility truck @ 22.50/day		22.50	
	6 Dump Trucks (Ollis, Kincaid, Alestra Wright/V. Alestra)			22.50
TOTAL - THURSDAY - APRIL 11, 1974 ----------				$665.63

THURSDAY; APRIL 11, 1974 - Coastal Dock

LABOR:	8 Supvs. 15 ea	68 hrs @ 12.50/hr	850.00	
		52 hrs @ 18.75/hr	975.00	
	1 Cleaner 11 hrs	8½ hrs @ 9.00/hr	76.50	
		2½ hrs @ 13.50/hr	33.75	
	1 Cleaner 14 hrs	8½ hrs @ 9.00/hr	76.50	
		5½ hrs @ 13.50/hr	74.25	
	1 Cleaner 13 hrs	8½ hrs @ 9.00/hr	76.50	
		4½ hrs @ 13.50/hr	60.75	
	4 Cleaners 12 ea	34 hrs @ 9.00/hr	306.00	
		14 hrs @ 13.50/hr	189.00	2,718.25
SUBSISTENCE:	4 men @ 25.00/day each			100.00
MATERIAL:	See last sheet			
EQUIPMENT:	3 Utility trucks @ 22.50/day each		67.50	
	1 Tractor Trailer	12 hrs @ 18.00/hr	216.00	
	2 Automobiles @ 22.50/day each		45.00	
	1 Power Work Boat	14 hrs @ 25.00/hr	350.00	678.50
TOTAL - THURSDAY - APRIL 11, 1974 ----------				$3,496.75

CBI ORIGINAL

THURSDAY, APRIL 11, 1974 - Beach Hill Area

LABOR:	1 Supervisor 12½ hrs	8½ hrs @ 12.50/hr	106.25	
		4 hrs @ 18.75/hr	75.00	
	4 Cleaners 12½ ea	34 hrs @ 9.00/hr	306.00	
		16 hrs @ 13.50/hr	216.00	703.25
MATERIAL:	See last sheet			
EQUIPMENT:	1 Utility truck @ 22.50/day			22.50
	1 Front End Loader (Derr & Son)			
SUBSISTENCE:	3 men @ 25.00/day each			75.00
TOTAL - THURSDAY - APRIL 11, 1974 ----------				$800.75

THURSDAY, APRIL 11, 1974 - Ft. Mercer Beach

LABOR:	2 Supvs. 12 ea	17 hrs @ 12.50/hr	212.50	
		7 hrs @ 18.75/hr	131.25	
	10 Cleaners 12 ea	85 hrs @ 9.00/hr	765.00	
		35 hrs @ 13.50/hr	472.50	1,581.25
SUBSISTENCE:	4 men @ 25.00/day each			100.00
MATERIAL:	See last sheet			
EQUIPMENT:	1 Utility truck @ 22.50/day			22.50
	1 Dump Truck, 1 Front End Loader (Del-Valley Constr)			
TOTAL - THURSDAY - APRIL 11, 1974 ----------				$1,703.75

THURSDAY, APRIL 11, 1974 - Texaco (Sanitarium Park)

LABOR:	1 Supv. 12 hrs	8½ hrs @ 12.50/hr	106.25	
		3½ hrs @ 18.75/hr	65.63	
	5 Cleaners 12 ea	42½ hrs @ 9.00/hr	382.50	
		17½ hrs @ 13.50/hr	236.25	790.63
EQUIPMENT:	1 Utility truck @ 22.50/day			22.50
	1 Front End Loader (Fones)			
	1 Dump Truck (Fones)			
TOTAL - THURSDAY - APRIL 11, 1974 ----------				$813.13

THURSDAY, APRIL 11, 1974 - Coastal Dock

LABOR:	1 Supv. 14 hrs	8½ hrs @ 12.50/hr	106.25	
		5½ hrs @ 18.75/hr	103.13	
	1 Cleaner 6 hrs	5 hrs @ 9.00/hr	45.00	
		1 hr @ 13.50/hr	13.50	
	4 Cleaners 11 ea	34 hrs @ 9.00/hr	306.00	
		10 hrs @ 13.50/hr	135.00	708.88
SUBSISTENCE:	1 man @ 25.00/day			25.00

continued (6)

Coastal Dock - continued

EQUIPMENT:	1 Front End Loader (Jennings) 2 Dump trucks (Pulio)			
TOTAL - THURSDAY - APRIL 11, 1974 ----------				$733.88

THURSDAY, APRIL 11, 1974 - Arco Dock "B"

LABOR:	3 Supvs. 13 ea	25½ hrs @ 12.50/hr	318.75	
		13½ hrs @ 18.75/hr	253.13	
	1 Supv. 15 hrs	8½ hrs @ 12.50/hr	106.25	
		6½ hrs @ 18.75/hr	121.88	
	3 Cleaners 10 ea	9 hrs @ 9.00/hr	81.00	
		21 hrs @ 13.50/hr	283.50	
	14 Cleaners 13 ea	119 hrs @ 9.00/hr	1,071.00	
		63 hrs @ 13.50/hr	850.50	3,086.01
MATERIAL:	75 Coastal Paks @ 5.25/bag		393.75	
	12 sections absorbent boom @ 20.00/sec.		240.00	
	300' - 36" Boom @ 1.50/ft/week (add'l)		450.00	
	Expendables - see last sheet			1,083.75
EQUIPMENT:	2 Small boats w/motor @ 25.00/day each		50.00	
	1 LCM	19 hrs @ 55.00/hr	1,045.00	
	2 Small Hertz vans @ 22.50/day each		45.00	
	1 Automobile @ 22.50/day		22.50	
	1 Power Work Boat	19 hrs @ 25.00/hr	475.00	
	1 Towboat (River Assoc. Inv.)			
	2 Utility trucks @ 22.50/day each		45.00	
	2 Swiss skimmers @ 50.00/day each		100.00	
	2 Vac. Trucks 11 ea	22 hrs @ 27.50/hr	605.00	
	1 Slurp skimmer @ 50.00/day		50.00	
	2 Hale Pumps @ 35.00/day each		70.00	2,507.50
SUBSISTENCE:	9 men @ 25.00/day each			225.00
DISPOSAL:	3,000 gallons @ 12¢/gal			360.00
TOTAL - THURSDAY - APRIL 11, 1974 ----------				$7,262.26

CBI ORIGINAL

FRIDAY, APRIL 12, 1974 - Arco Dock "B"

LABOR:	3 Supvs. 3 ea	9 hrs @ 12.50/hr	112.50	
	1 Supv.	6 hrs @ 12.50/hr	75.00	
	1 Supv. 8 hrs	1 hr @ 12.50/hr	12.50	
		7 hrs @ 18.75/hr	131.25	
	8 Cleaners 6 ea	48 hrs @ 9.00/hr	432.00	
	1 Cleaner 8 hrs	1 hr @ 9.00/hr	9.00	
		7 hrs @ 13.50/hr	94.50	866.75
SUBSISTENCE:	3 men @ 25.00/day each			75.00
MATERIAL:	See last sheet			
EQUIPMENT:	1 Power Work Boat	14 hrs @ 25.00/hr	350.00	
	1 LCM	14 hrs @ 55.00/hr	770.00	
	1 Automobile @ 22.50/day		22.50	
	1 Utility truck @ 22.50/day		22.50	1,165.00
TOTAL - FRIDAY - APRIL 12, 1974 ----------				$2,106.75

FRIDAY, APRIL 12, 1974

DISPOSAL:	30 loads @ 50.00/load (see attached inv.)	1,500.00
	Plus 15%	225.00
TOTAL - FRIDAY - APRIL 12, 1974 ----------		$1,725.00

FRIDAY, APRIL 12, 1974 - Arco Dock

LABOR:	1 Supv.	5½ hrs @ 18.75/hr	103.13	
	5 Cleaners 5½ ea	27½ hrs @ 13.50/hr	371.25	474.38
EQUIPMENT:	2 Utility trucks @ 22.50/day each			45.00
TOTAL - FRIDAY - APRIL 12, 1974 ----------				$519.38

Cleaning of Boom: 1900' - 36" boom @ 1.00/ft. $1,900.00

CBI ORIGINAL

Total our Invoice ----------$ 39,370.06

SUBCONTRACTORS

F. Pulio	489.51		
Jennings Construction	1,220.00		
Kenneth A. Fones	360.00		
Delaware Valley Construction	360.00		
Delaware Valley Construction	300.00		
James Alestra	250.00		
Vince Alestra	250.00		
Wayne E. Kincaid	450.00		
William E. Wright	262.50		
Jack R. Ollis	225.00		
Derr & Son	1,087.50		
River Associates	1,965.00	7,219.51	
	Plus 15%	1,082.93	8,302.44

EXPENDABLES

Goodall Inv. #7285	660.00		
Del-Val Hardware Inv. #A2072	828.39		
#A2073	676.80	2,165.19	
	Plus 15%	324.78	2,489.97

TOTAL INVOICE $ 50,162.47

(9)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CBI ORIGINAL

SEA HORSE CLEAN WATER TO THE INDUSTRY

Customer's Order S.C. Weber, Mgr. Date May 21, 1974

SOLD TO: Arco Pipe Line Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO: Oil Pollution Control Operation on behalf of M/T Elias & Owners, et-al, at Arco Dock, Ft. Mifflin, Pa from 0800 4/16 thru May 19, Sunday.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
		Net			3111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
		SUMMARY 1st billing		
		Enclosure 1 - Labor =	$67002 63	
		Enclosure 2 - Motels & Meals =	$10248 00	
		Enclosure 3 - Materials, Equip. & Transport. =	$75638 38	
		Total Amount Due to CWI		$152889 01
			PARTIAL PAYMENT 6-25-74	100,000 00
		This invoice covers Clean Water, Inc. Oil Pollution Control Operations on behalf of M/T Elias & Owners at the Arco Dock, Ft. Mifflin, Pa, From 4/16/74 thru 5/19/74. (There are a few small bills which will be includes in the 2nd billing). We respectfully request payment of this Invoice as soon as possible.	PAY BAL.	52889.01

APPROVED

UD 74

INDEXED JUL 5 1974

INVOICE

(10)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CBI ORIGINAL

1ST Billing

TO: Arco Pipe Line Co.
P.O. Box 2086
Sinking Spring, PA 19608

C.W.I. INVOICE NO. 3111-3

DATE May 21, 1974

JOB M/T Elias
Arco Dock, Ft. Mifflin,
S.C. Weber, MG

CUSTOMER ORDER NO.

ENCLOSURE No. 1 - LABOR	TERMS: NET CASH	AMOUNT
Week Ending 4/21/74		
Clean Water, Inc.- Workmen		
619 ST hrs @ $ 7.00 per hr	= $ 4333.00	
979½ OT hrs @ $ 9.07 per hr	= $ 8884.07	
Clean Water, Inc. - Leaderman		
12 ST hrs @ $ 8.00 per hr	= $ 96.00	
20 OT hrs @ $ 10.36 per hr	= $ 207.20	
Clean Water, Inc.-Foreman		
180 ST hrs @ $ 9.50 per hr	= $ 1710.00	
283½ OT hrs @ $ 12.46 per hr	= $ 3532.41	
Clean Water, Inc.-Superintendent		
32 ST hrs @ $ 15.00 per hr	= $ 480.00	
38 OT hrs @ $ 19.73 perhr	= $ 749.74	$ 19,992.42
Week Ending 4/28/74		
Clean Water, Inc. - Workmen		
854½ ST hrs @ $ 7.00 per hr	= $ 5981.50	
878 OT hrs @ $ 9.07 per hr	= $ 7963.46	
Clean Water, Inc. - Leaderman		
72 ST hrs @ $ 8.00 per hr	= $ 576.00	
64 OT hrs @ $ 10.36 per hr	= $ 663.04	
Clean Water, Inc. - Foreman		
217 ST hrs @ $ 9.50 per hr	= $ 2061.50	
235 OT hrs @ $ 12.46 per hr	= $ 2928.10	
Clean Water, Inc.- Superintendent		
18 ST hrs @ $ 15.00 per hr	= $ 270.00	
19 ST hrs @ $ 19.73 per hr	= $ 374.87	$ 20,818.47

(11)

TO: Arco Pipe Line Co.
P.O. Box 2086
Sinking Spring, PA 19608

CLEAN WATER FOR A HOLY LAND TO THE INDUSTRY

C.W.I. INVOICE NO. 3111-3

DATE May 21, 1974

JOB Arco Dock, Ft. McHenry
M/T Elias

CUSTOMER ORDER NO. S.C. Weber, Mgr.

ENCLOSURE No. 1 - LABOR	TERMS: NET CASH	AMOUNT
Week Ending 5/5/74	Page 2	
Clean Water, Inc. - Workmen		
421 ST hrs @ $ 7.00 per hr	= $ 2947.00	
455 OT hrs @ $ 9.07 per hr	= $ 4126.85	
Clean Water, Inc. - Leaderman		
32 ST hrs @ $ 8.00 per hr	= $ 256.00	
37 OT hrs @ $ 10.36 per hr	= $ 383.32	
Clean Water, Inc. - Foreman		
120 ST hrs @ $ 15.00 per hr	= $ 1800.00	
131 OT hrs @ $ 19.73 per hr	= $ 2584.63	$ 12,097.80
Week Ending 5/12/74		
Clean Water, Inc. - Workmen		
292 St hrs @ $ 7.00 per hr	= $ 2044.00	
313½ OT hrs @ $ 9.07 per hr	= $ 2843.45	
Clean Water, Inc.- Leaderman		
4 St hrs @ $ 8.00 pr hr	= $ 32.00	
24 OT hrs @$ 10.36 per hr	= $ 248.64	
Clean Water, Inc. - Foreman		
99 ST hrs @$ 9.50 per hr	= $ 940.50	
82 OT hrs @ $ 12.46 per hr	= $ 1021.72	$ 7130.31
Week Ending 5/19/74		
Clean Water, Inc. - Workmen		
298 ST hrs @ $ 7.00 per hr	= $ 2086.00	
296 OT hrs @ $ 9.07 per hr	= $ 2684.72	
Clean Water, Inc. - Leaderman		
74 ST hrs @ $ 8.00 per hr	= $ 592.00	
83 OT hrs @ $ 10.36 per hr	= $ 859.88	
Clean Water, Inc. - Foreman		
38 ST hrs @ 9.50 per hr	= $ 361.00	
30½ OT hrs @$ 12.46 per hr	= $ 380.03	$ 6963.63
	Total Labor Due	$67,002.63

(12)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

CBI ORIGINAL

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CLEAN WATER — SEA HORSE — TO THE INDUSTRY

Customer's Order SC Weber

Date May 21, 1974

SOLD TO
Arco Pipe Line Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control Operation on behalf of M/T Elia & Owners et-al at Arco Dock Ft. Mifflin, PA from 0800 Tue thru Sun 5/19.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
				Enclosure 2	3111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
		MOTEL & MEALS. 1st billing		
		M = Motels & meals @ $ 20.00 per day ea. man		
		(M) = Meals only @$ 7.00 per day per man		
		Week Ending 4/21/74		
		Tue 4/16/74 - 19 men @ $ 20.00 per day ea. =	$ 380 00	
		Wed 4/17/74 - 35 men @$ 20.00 per day ea. =	$ 700 00	
		Thu 4/18/74 - 27 men @ $ 20.00 per day ea. =	$ 540 00	
		Fri 4/19/74 - 27 men @ $ 20.00 per day ea. =	$ 540 00	
		Sat 4/20/74 - 34 men @ $ 20.00 per day ea. =	$ 680 00	
		Sun 4/21/74 - 34 men @ $ 20.00 per day ea. =	$ 680 00	$3520 00
		Week Ending 4/28/74		
		Mon 4/22/74 - 29 men @ $ 20.00 per day ea. =	$ 580 00	
		Tue 4/23/74 - 30 men @ $ 20.00 per day ea. =	$ 600 00	
		Wed 4/24/74 - 26 men @ $ 20.00 per day ea. =	$ 520 00	
		Thu 4/25/74 - 21 men @ $ 20.00 per day ea. =	$ 420 00	
		Fri 4/26/74 - 20 men @ $ 20.00 per day ea. =	$ 400 00	
		Sat 4/27/74 - 18 men @ $ 20.00 per day ea. =	$ 360 00	$2880 00
		Week Ending 5/5/74		
		Mon 4/29/74 - 14 men x $ 20.00 per day ea. =	$ 280 00	
		Tue 4/30/74 - 12 men x $ 20.00 per day ea. =	$ 240 00	
		Wed 5/1/74 - 14 men x $ 20.00 per day ea. =	$ 280 00	
		Thu 5/2/74 - 14 men x $ 20.00 per day ea. =	$ 280 00	
		Fri 5/3/74 - 10 men x $ 20.00 per day ea. =	$ 200 00	
		Sat 5/4/74 - 11 men x $ 20.00 per day ea. =	$ 220 00	
		1 man x $ 7.00 per day =	$ 7 00	
		Sun 5/5/74 = 11 men x $ 20.00 per day ea. =	$ 220 00	$1727 00

INVOICE

(13)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CBI ORIGINAL

CLEAN WATER — SEA HORSE — TO THE INDUSTRY

Customer's Order S.C. Weber, Mgr. Date May 21, 1974

SOLD TO
Arco Pipe Line Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control
Operation on behalf of M/T
Elias & Owners et-al at
Arco Dock, Ft. Mifflin, PA
from 0800 Tue 4/16 thru
Sun 5/19.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B		OUR ORDER NUMBER
				Enclosure 2	3111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
		Page 2 Motels & Meals (con't) 1st billing		
		Week Ending 5/12/74		
		Mon 5/6/74 - 7 men x $ 20.00 per day ea.	= $ 140 00	
		1 man x $ 7.00 per day 1	= 7 00	
		Tue 5/7/74 - 8 men x $ 20.00 per day ea.	= 160 00	
		1 man x $ 7.00 per day	= 7 00	
		Wed 5/8/74 - 9 men x $ 20.00 per day ea.	= 180 00	
		Thu 5/9/74 - 10 men x $ 20.00 per day ea.	= 200 00	
		Fri 5/10/74- 9 men x $20.00 per day ea.	= 180 00	
		Sat 5/11/74- 7 men x $ 20.00 per day ea.	= 140 00	
		Sun 5/12/74- 8men x $ 20.00 per day ea.	= $ 160 00	$ 1174 00
		Week Ending 5/19/74		
		Mon 5/13/74 - 8 men x $ 20.00 per day ea.	= 160 00	
		1 man x $ 7.00 pr day	= 7 00	
		Tue 5/14/74 - 8 men x $ 20.00 per day ea.	= 160 00	
		Wed 5/15/74 - 1 man x $ 20.00 per day	= 20 00	
		Thu 5/16/74 - 9 men x $ 20.00 per day ea.	= 180 00	
		Fri 5/17/74 - " " " "	= 180 00	
		Sat 5/18/74 - 6 men x $ 20.00 per day ea.	= 120 00	
		Sun 5/19/74 - " " " "	= $ 120 00	$ 947 00
		Total Motels Due		$10248 00

INVOICE

(14)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CBI ORIGINAL

CLEAN WATER — SEA HOSE TO THE INDUSTRY

S.C. Weber, Mgr.

Customer's Order — Date May 21, 1974

SOLD TO
Arco Pipe Line Co.
P.O. Box 2086'
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control Operation on behalf of M/T Elias & Owners,et-al. at Arco Dock, Ft. Mifflin, PA from 0800 4/16 thru May 19, Sunday.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
			Page 1	Enclosure 3	3111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
		MATERIALS, EQUIPMENT & TRANSPORTATION.		
	A,	Clean Water, Inc. Offshore Inflatable Oil Containment Boom @ $ 2.00 per ft 1st day, $1 per ft. each day thereafter for 7 days, from 8th day thru the 14th day, 75¢ per ft. From the 15th and each day thereafter 50¢ per ft. Note: Charged US.CG 4 day boom rental.		
Tue 4/16/74		1000' @ 1.00 per ft. =	$ 1000 00	
Wed 4/17/74		1000' @ 1.00 per ft. =	1000 00	
Thu 4/18/74		1000' @1.00 per ft. =	1000 00	
Fri 4/19 thru Thur 4/25= 7 days x $750.00 ea day =			5250 00	
Fri 4/26 thru 5/2= 7 days x $500.00@ 50¢ per ft. =			3500 00	
Fri 5/3 thru Sun 5/19 17 days @ 500.00 ea day @50¢ per =			8500 00	
				$20250 00
	B.	Clean Water, Inc. Harbor Oil Containment Boom @$1.50 per ft 1st day @ .333 per ft. ea. day thereafter for 7 days, from the 8th day thru the 14th day @ .250 per ft from the 15th day .167 per ft. ea. day thereafter. Charged U.S.C.G. 4 days boom rental.		
Tue 4/16/74		3100 ft. @ .333per ft. =	$ 1032 30	
Wed 4/17/74		" " " " =	1032 30	
Thu 4/18/74		3100 ft. @ .333 per ft. =	1032 30	
Fri 4/19/74 thru 4/23-5 days @ .250 ea per ft. 3100' =			3875 00	
Fri 4/24/74 thru 4/25-2 days @.250 per ft. per day 2300' =			1150 00	
Fri 4/26/74		2300 ft. @ .167 per ft. 2300' =	384 10	
Sat 4/27 thru 5/1 -5 days @.167 per ft per day 2000' =			1670 00	
5/2/74		1000' @ .167 per ft. 1000' =	167.00	
5/3/74 thru 5/9/-7 days @ .167 per ft pr day-1200' =			1403 80	
5/10/74 thru 5/17- 8 days @ .167 per ft per day 1400' =			1870 40	
5/18 to 5/19 2 days 1400' @ .167 per ft per day =			466 20	
				$14082 40

INVOICE

(15)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE P. O. BOX 1002	08753	201 341-3600 24 HOURS

SEA HORSE CLEAN WATER TO THE INDUSTRY

CBI ORIGINAL

Customer's Order S.C. Weber, Mgr. Date May 21, 1974

SOLD TO
Arco Pipe Line Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control
Operation on behalf of
M/T Elias & Owners, et-al.
at Arco Dock, Ft. Miffline
Pa from 0800 4/16 thru May
19, Sunday.

DATE SHIPPED	SHIPPED VIA	TERMS	F O B		OUR ORDER NUMBER
			Page 2	Enclosure 3	3111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
	C.	Clean Water, Inc. Sorbent C petroleum absorbent material @ $ 3.95 per 18 lb. bag.		
4/17/74	Wed	30 bags @ $ 3.95 per bag =	$ 118 50	
4/18/74	Thu	10 bags @ $ 3.95 per bag =	$ 39 50	
4/20/74	Sat	20 " " " =	$ 79 00	
4/21/74	Sun	15 bags @ $ 3.95 per bag =	$ 59 25	
4/22/74	Mon	12 " " " =	$ 47 40	
4/25/74	Thu	10 " " " =	$ 39 50	
4/27/74	Sat	46 " " " =	$ 181 70	
4/30/74	Tue	15 " " " =	$ 59 25	
5/1/74	Wed	20 " " " =	$ 79 00	
Fri 5/3	thru	Tue 5/6 = 26 Bags @ $ 3.95 ea. =	$ 102 70	
5/8/74	Wed	12 Bags @ $ 3.95 per bag =	$ 47 40	
5/9/74	Thu	6 Bags @ $ 3.95 per bag =	$ 23 70	
Fri 5/10	thru	Tue 5/14= 21 Bags @ $ 3.95 ea. =	$ 82 95	
5/15/74	Wed	2 Bags @ $ 3.95 per bag =	$ 7 90	
5/16/74	Thu	27 " " " =	$ 106 65	
5/17/74	Fri	3 Bags @ $ 3.95 per bag. =	$ 31 60	
				$ 1106 00
	D.	Clean Water, Inc. 3" Double Diaphram spark proof pumps @ $ 7.50 per hr ea.		
4/16/74	Tue	8 pumps-12 hrs x $7.50 pr hr =	$ 720 00	
4/17/74	Wed	6 pumps-12 hrs x $7.50 per hr =	$ 540 00	
4/18/74	Thu	" " " " " =	$ 540 00	
4/19/74	thru	4/23= 5 days- 4 pumps-12 hrs x $7.50 per hr Each day. =	$ 1800 00	
4/24/74	thru	5/2/74= 9 days-2 pumps x 12 hrs x $7.50 per hr each day =	$ 1620 00	
5/10/74	Fri	3 pumps- 3 hrs x $ 7.50 per hr =	$ 67 50	
5/13/74	Mon	3 pumps- 6 hrs x $ 7.50 per hr =	$ 135 00	
				$5422 50

INVOICE

(16)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CBI ORIGINAL

SEA HORSE CLEAN WATER TO THE INDUSTRY

Customer's Order S.C. Weber, Mgr. Date May 21, 1974

SOLD TO
Arco Pipe Line Co.
P.O. Box 2036
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control
Operation on behalf of
M/T Elias & Owners, et-al
At Arco Dock, Ft. Mifflin
Pa from 0800 4/16 thru May
19, Sunday.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
			Page 3	Enclosure 3	3111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE		AMOUNT	
	E.	Clean Water, Inc. 3" hard rubber & discharge hose @ 80¢ per 20' length per hr.				
From	4/16/74	Tue thru Thur 5/2= A total of 17 days- 32 lengths x 12 hrs @ 80¢ per length ea. day =	$ 5223	42		
		Due to the length of the job, total will be discount	$ 2000	00	$ 3223.42	
	F.	Clean Water, Inc. 2" hard rubber air hose @ $150 per hr per 50' length.				
From	4/1674	thru 5/2/74= 17 days-200'-4lengths x $1.50 per hr x 12 hrs ea. day =	$ 1224	00		
		Due to the extended lenght of jobdiscount =	$ 300	00	$ 924	00
	G.	Clean Water, Inc. 3/4" air hose @$ 1.00 per hr per 50' length.				
4/16/74	thru	4/22= total of 7 days= 6 lengths @ $1.00 per hr x 12 hrs ea. day (72.00 per day) 300' =	$ 504	00		
4/23/74	Tue	305'= 7 lengths @ $1.00 per hr x 12 hrs =	$ 84	00		
4/24/74	Wed	" " " " " =	$ 84	00		
4/25/74	thru	5/2= total of 8 days= 6 lengths x $1.00 per hr x 12 hrs ea day ($84.00 per day) 300' =	$ 672	00		
		Because of extended length of job discount =	$ 444	00	$ 900	00
	H.	Clean Water, Inc. 900 cu. ft. air compressor @ $ 12.00 per hr. + diesel oil & transp.				
4/20/74	Sat	3 hrs @ $ 12.00 per hr =	$ 36	00		
4/21/74	Sun	2 hrs @ $ 12.00 per hr =	$ 24	00		
4/24/74	Wed	" " " " =	$ 24	00		
4/26/74	Fri	8 hrs @ $ 12.00 per hr =	$ 96	00		
4/27/74	Sat	" " " " =	$ 96	00		
					$ 276	00

INVOICE

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CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CBI ORIGINAL

CLEAN WATER — SEA HORSE — TO THE INDUSTRY

Customer's Order S.C. Weber, Mgr. Date May 21, 1974

SOLD TO: Arco Pipe Line Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO: Oil Pollution Control
Operation on behalf of M/S
Elias & Owners, Et-al, at
Arco dock, Ft. Mifflin, PA
from 0800 4/16 thru May 19
Sunday.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
			Page 4	Enclosure 3	31111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
	T.	Clean Water, Inc. 40' salvage & pollution gear @ $ 75.00 per + transportation. 1st 4 days charged to U.S.C.G.		
4/16/74 Tue		Day Rate =	$ 75 00	
4/17/74 Wed		Day Rate =	$ 75 00	
4/18/74 Thu		Day Rate =	$ 75 00	
4/19 thru 4/25/74		7 days 2nd week =	$ 75 00	
4/26/74 thru 5/2/74		7 days 3rd week =	$ 75 00	
5/3 thru 5/9/74		7 days 4th week =	$ 75 00	
5/10 thru 5/16/74		7 days 5th week =	$ 75 00	$ 525 00
	J1.	Clean Water, Inc. 3" fire pumps @$4.00 pr hr.		
4/16/74 thru		4/21/74 = Total 6 days=2 pumpsx 8 hrs X$8.00 ea	$ 384 00	
4/22/74 Mon		4 pumps- 8 hrs ea x $16.00 ea. =	$ 128 00	
4/23/74 Tue		4 pumps- 8 hrs ea x $16.00 ea. =	$ 128 00	
4/24/74 Wed		2 pumps- 8 hrs x $ 8.00 ea. =	$ 64 00	
4/25/74 Thu		" " " " " =	$ 64 00	
4/26/74 Fri		" " " " " =	$ 64 00	
4/27/74 Sat		" " " " " =	$ 64 00	
		Toy & Son, Dealers In steel drums-		$ 896 00
	K.	Empty 55 gal. open head drums @$XXXXXXXXX.		
4/16/74 Tue		413- drums @ $XXXXXXXXX. =	$ 2037 20	$2037 20.
	L.	Clean Water, Inc. Ford 7 cu ft.yd. Dump truck @ 10.00 per hr in use + 10¢ per mile ± tolls.		
4/17/74 Wed		120 miles @ 10¢ =	$ 12 00	
		8 hrs @$ 10.00 =	$ 80 00	$ 92 00
	M.	Clean Water, Inc. Harvester Winch Stake @ $10.00 per hr + 10¢ per mile + tolls.		
4/23/74 Tue		6 hrs @ $ 10.00 per hr =	$ 60 00	$ 60 00

INVOICE

(18)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CBI ORIGINAL

CLEAN WATER TO THE INDUSTRY

Customer's Order S. C. Weber, Mgr. Date May 21, 1974

SOLD TO
Arco Pipe Line Co.
P. O. Box 2096
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control
Operation on behalf of
M/T Elias & Owners, et-al
At Arco Dock, Mifflin
Pa from 0800 4/16 thru Ma
19, Sunday.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
			Page 5	Enclosure 3	3111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
	M.	(Con't)		
4/25/74 Thu		8 hrs @$ 10.00 per hr =	$ 80 00	
4/27/74 Sat		4 hrs @ $10.00 per hr =	$ 40 00	
5/ 2/74 Thu		6 hrs @$ 10.00 per hr =	$ 60 00	$ 240 00
	Ml.	Clean Water, Inc. 2 ton Stake 4 x 4 @ $ 10.00 per hr + $10¢ per mile + tolls.		
4/16/74 Tue		87 miles @ $10¢ per mile =	$ 8 70	
		4 hrs @ $ 10.00 per hr =	$ 40 00	
		Tolls =	$ 90	$ 49 60
	N.	Clean Water, Inc. 4 x 4 1 ton stake truck @ $ 5.00 per hr + 10¢ per mile + tolls.		
5/4/74 Sat		8 hrs @ $ 5.00 per hr =	$ 40 00	
5/5/74 Sun		12 hrs @$ 5.00 per hr =	$ 60 00	
5/17/74 Fri		6 hrs @$ 5.00 per hr =	$ 30 00	$ 130 00
	O.	Clean Water, Inc. 3/4 ton GMC pick up truck @ $ 2.00 per hr + tolls + 10¢ per mile.		
4/16/74 Tue		30 miles @10¢ per mile =	$ 3 00	
		12 hrs @$ 2.00 per hr =	$ 24 00	
4/17/74 thru		4/30/74= Total of 13 days @ $12.00 per hr each day @ 12 hrs ea. day =	$ 312 00	
5/1/74 thru		5/6/74- Total of 6 days @$2.00 per hr ea. day @ 12 hrs ea. day =	$ 144 00	
5/7/74 Tue		7 hrs @ $ 2.00 per hr =	$ 14 00	
5/8/74 Wed		12 hrs @ $ 2.00 per day =	$ 24 00	
5/9/74 thru		5/14-total of 6 days @ $ 2.00 per hr ea. day & 12 hrs ea day =	$ 144 00	
5/15/74 Wed		10 hrs @$ 2.00 per hr =	$ 20 00	
5/16/74 Thu		12 hrs @ $ 2.00 per hr =	$ 24 00	
5/17/74 Fri		" " " " =	$ 24 00	$ 733 00

INVOICE

(19)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

ORIGINAL

CLEAN WATER — SEA HORSE — TO THE INDUSTRY

Customer's Order S. C. Weber, Mgr. Date May 21, 1974

SOLD TO
Arco Pipe Line Co.
P. O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control Operation on behalf of M/T Elias & Owners, et-al. At Arco Dock, Ft. Mifflin, Pa from 0800 4/16 thru May 19, Sunday.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
			Page 6	Enclosure 3	3111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION		UNIT PRICE	AMOUNT
	P.	Clean Water, Inc. 18 foot deck over trailer @ $ 15.00 per hr.			
4/17/74	Wed	8 hrs @$ 15.00 per hr	=	$ 120 00	$ 120 00
	T.	Clean Water, Inc. Workboats @$12.00 per hr or $ 60.00 per day.			
4/16/74	Tue	4 workboats- day rate	=	$ 240 00	
4/17/74	Wed	" " " "	=	$ 240 00	
4/18/74	Thu	3 " " " "	=	$ 180 00	
4/19/74	Fri	" " " "	=	$ 180 00	
4/20/74	Sat	4 " " " "	=	$ 240 00	
4/21/74	Sun	" " " "	=	$ 240 00	
4/22/74	Mon	" " " "	=	$ 240 00	
4/23/74	Tue	3 " " "	=	$ 180 00	
4/24/74	Wed	" " " "	=	$ 180 00	
4/25/74	Thu	" " " "	=	$ 180 00	
4/26/74	Fri	4 " " "	=	$ 240 00	
4/27/74	Sat	" " " "	=	$ 240 00	
4/28/74	thru	5/6/74-total of 9 days= 2 boatsx $60.00 ($120.00 per day x 9)	=	$ 1080 00	
5/7/74	Tue	3 workboats - day rate	=	$ 180 00	
5/8/74	Wed	" " " "	=	$ 180 00	
5/9/74	Thu	" " " "	=	$ 180 00	
5/10/74	thru	5/17/74-total of8 days= 2 boats x $60.00 ($120.00 per day x 8)	=	$ 960 00	
5/18/74	Sat	1 workboat- day rate	=	$ 60 00	
5/19/74	Sun	2 " "	=	$ 120 00	$5340 00
	U.	Clean Water, Inc. Work Station Wagon @ 10¢ per mile + $ 2.00 per hr in use + tolls.			
4/16/74	Tue	40 miles @ 10¢ per mile	=	$ 4 00	
		8 hrs @ $ 2.00 per hr	=	$ 16 00	
4/17/74	Wed	8 hrs @$ 2.00 per hr	=	$ 16 00	
4/20/74	Sat	12 hrs @$ 2.00 per hr	=	$ 24 00	(con"t)

INVOICE

(20)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

CBI ORIGINAL

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CLEAN WATER TO THE INDUSTRY

Customer's Order S. C. Weber, Mgr. Date May 21, 1974

SOLD TO
Arco Pipe Line Co.
P. O. Box 2096
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control Operation on behalf of M/T Elias & Owners, et-al. At Arco Dock, Ft. Mifflin, Pa from 0800 4/16 thru May 19, Sunday.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
			Page 7	Enclosure 3	3111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
	J.	(con't)		
4/23/74 Tue		144 miles @10¢ per mile =	$ 14 40	
		5 hrs @$ 2.00 per hr =	$ 10 00	
4.24.74 Wed		144 miles @10¢ per mile =	$ 14 40	
		5 hrs @$ 2.00 per hr =	$ 10 00	
4/25/74 Thu		6 hrs @$ 2.00 per hr =	$ 12 00	
4/26/74 Fri		" " " " =	$ 12 00	
4/27/74 Sat		4 hrs @$ 2.00 per hr =	$ 8 00	$ 140 80
	V.	Vanguard Transportation Inc. Tanker Trucks @ $110.00 per day ea. (5700 capacity) + transp. & tolls =	$ 8738 40	$8738 40
	Y.	Broadbents Spray Rentals of 600 cu ft. air compressor-Schram diesel from 4/16 thru 5/12 =	$ 1429 95	$1429 95
	Z.	Motor Crane-1972 Model 195C Hydynamic 14½ ton Cherry Picker with 48 ft. boom @$21.32. CWI supplied operator. From 4/16 thru 4/30/74 =	$ 3836 25	$3836 25
	AA.	Diesel Fuel- 39-55 gallon drums=1638 gallons x 42¢ per gallon =	$ 687 96	$ 687 96
	CC.	Clean Water, Inc. 2½ KW Elect. Generator @$2.00 per hr @8 hrs a dayx $2.00 per hr = 16.00 per day.		
4/16/-4/26		= 11 days x $16.00 per day =	$ 176 00	
4/29/-5/4/74		= 6 days x $16.00 per day =	$ 96 00	
5/15-5/18		= 4 days x $16.00 per day =	$ 64 00	$ 336 00
	DD.	Clean Water, Inc. air driven spark proof light @ $ 1.00 per hr @ 8 hrs per day x 1.00= $8.00 per day.		
4/16/74 thru 4/23= 8 day x $8.00		=	$ 64 00	$ 64 00

INVOICE

(21)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

CB! ORIGINAL

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CLEAN WATER TO THE INDUSTRY

Customer's Order S. C. Weber, Mgr Date May 21, 1974

SOLD TO
Arco Pipe Line Co.
P. O. Box 2086
Sinking Spring, PA 19603

SHIPPED TO
Oil Pollution Control Operation on behalf of M/T Elias & Owners, et-al. At Arco Dock, Ft. Mifflin, Pa from 0900 4/16 thru May 19 Sunday.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B		OUR ORDER NUMBER
			Page 8	Enclosure 3	3111-3

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
	EE.	Transportation:		
		1. 1 Auto (Vergiza) =	$ 17 28	
		2. 1 Auto (Dear) =	$ 36 12	
		3. 1 Auto (Boulton) =	$ 14 40	
				$ 67 80
	GG.	Materials Supplied by CWI.		
4/17/74 Wed		300- ½" manilla line =	$ 51 00	
5/3/74 Fri		5-55 gal. drums of mineral spirits =	$ 360 00	
				$ 411 00
	HH.	Clean Water, Inc. 900 cu. ft. air compressor @$ 12.00 per hr + diesel fuel + transportation.		
5/10/74 Fri		3 hrs @$ 12.00 per hr =	$ 36 00	
5/13/74 Mon		6 hrs @$ 12.00 per hr =	$ 72 00	
				$ 108 00
	HH.	Fones & Freas-Woodstown, N.J.		
		Rental of Dump Truck & AutoCar =	$ 2806 10	$2806 10
	II.	Mac Sanitary Landfill, Inc. Clements Bridge Road, Deptford, N.J. =	$ 605 00	$ 605 00
		Total Amount Due to CWI for Encl. 3		$7563.38

INVOICE

(22)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

CBI ORIGINAL

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CLEAN WATER FOR THE INDUSTRY

USE THIS AS "ORIGINAL INVOICE"
UNABLE TO LOCATE "ORIGINAL"
PER CE AISXANDER 7-5-74

Customer's Order S.C. Weber, Mgr. Date June 7, 1974

7-5-74

SOLD TO
Arco Pipeline Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control Operation on behalf of M/T Elias & Owners, et-al at Arco Dock Ft. Mifflin, Pa.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
				Enclosure 3	3111-3-2

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
		SUMMARY		
		Enclosure 1 - Labor	$15117 67	
		Enclosure 2 - Motel & Meals	$ 1960 00	
		Enclosure 3 - Materials, Equip & Transp.	$23430 31	
		Total Amt Due CWI		$40507 98

APPROVED
JUL 5 1974

This invoice covers Clean Water, Inc. Oil Pollution Control Operations on behalf of M/T Elias & Owners at the Arco Dock, Ft. Mifflin, PA from 5/20/74 thru 6/4/74. We respectfully request payment of this invoice as soon as possible.

UD 74
K Alexander

INDEXED JUL 8 1974

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CLEAN WATER, INCORPORATED

CBI ORIGINAL

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CLEAN WATER — A NOISE TO THE INDUSTRY

TO: Arco Pipeline Co.
P.O. Box 2086
Sinking Spring, PA 19608

C.W.I. INVOICE NO. 3111-3-2

DATE June 7, 1974

JOB Ft. Mifflin, PA
M/T Elias

CUSTOMER ORDER NO. S.C. Weber, M

ENCLOSURE No. 1 - LABOR	TERMS: NET CASH	AMOUNT
Clean Water, Inc. - Workmen	Week Ending 5/26/74	
249 ST hrs @$ 7.00 per hr	= 1743.00	
290 OT hrs @$ 9.07 per hr	= 2630.30	
Clean Water, Inc. - Leaderman		
104 ST hrs @ $8.00 per hr	= 832.00	
96 OT hrs @$10.36 per hr	= 994.56	
Clean Water, Inc. - Foreman		
40 ST hrs @$ 9.50 per hr	= $380.00	
52 OT hrs @$12.46 per hr	= $647.92	$ 7227.78
Clean Water, Inc. Week Ending 6/2/74		
Clean Water, Inc. - Workmen		
232 ST hrs @$ 7.00 per hr	= $1624.00	
338 OT hrs @$ 9.07 per hr	= $3065.66	
Clean Water, Inc. - Leaderman		
52 ST hrs @$ 8.00 per hr	= $ 416.00	
69 OT hrs @$10.36 per hr	= $ 714.84	
Clean Water, Inc. - Foreman		
32 ST hrs @$ 9.50 per hr	= $ 304.00	
52 OT hrs @$12.46 per hr	= $ 647.92	$ 6772.42
Week Ending 6/2/74		
Clean Water, Inc. - Workmen		
70 ST hrs @$7.00 per hr	= $ 490.00	
25 OT hrs @$9.07 per hr	= $ 226.75	
Clean Water, Inc.- Leaderman		
24 ST hrs @$8.00 per hr	= $ 192.00	
8 OT hrs @$10.36 per hr	= $ 82.88	
Clean Water, Inc.- Foreman		
8 ST hrs @$ 9.50 per hr	= $ 76.00	
4 OT hrs @$12.46 per hr	= $ 49.84	$ 1117.47
	(24) Total Amount Labor Due CWI	$15117.67

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CBI ORIGINAL

SEA HORSE
CLEAN WATER
TO THE INDUSTRY

Customer's Order S.C. Weber, Mgr. Date June 7, 1974

SOLD TO
Arco Pipeline Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control Operation on behalf of M/T Eli & Owners, et-al AT arco Dock
Ft. Mifflin, PA

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		O.K. ORDER NUMBER
				Enclosure 2	3111-3-2

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
		MOTEL & MEALS		
		Week Ending 5/26/74		
		Mon 5/20/74 - 6 men x $20.00 per man per day =	120 00	
		Tue 5/21/74 - 7 men x $20.00 per day per man =	140 00	
		Wed 5/22/74 - " " " " =	140 00	
		Thu 5/23/74 - " " " " =	140 00	
		Fri 5/24/74 - 6 " " " =	120 00	
		Sat 5/25/74 - 7 " " " =	140 00	
		Sun 5/26/74 - 7 " " " =	140 00	$940 00
		Week Ending 6/2/74		
		Mon 5/27/74 - 7 men x $20.00 per day per man =	140 00	
		Tue 5/28/74 - 7 men x $20.00 per day per man =	140 00	
		Wed 5/29/74 - " " " " =	140 00	
		Thu 5/30/74 - " " " " =	140 00	
		Fri 5/31/74 - 6 " " " =	120 00	
		Sat 6/1/74 - 6 " " " =	120 00	
		Sun 6/2/74 - 4 " " " =	80 00	$ 880 00
		Week Ending 6/9/74		
		Mon 6/3/74 - 6men x $20.00 per day per man =	120 00	
		Tue 6/4/74 - 1 man x $20.00 per day per man =	20 00	$ 140 00
		Total Motel & meals =		$1960 00

INVOICE

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CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CBI ORIGINAL

CLEAN WATER — SEA HORSE — TO THE INDUSTRY

Customer's Order S.C. Weber, Mgr. Date June 7, 1974

SOLD TO
. Arco Pipeline Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control
Operation on behalf of M/T
Elias & Owners, et-al. at
Arco Dock, Ft. Mifflin, PA

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
			Page 1	Enclosure 3	3111-3-2

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
	A.	Clean Water, Inc. Offshore Inflatable Oil Containment Boom @$ 2.00 per ft 1st day, $1.00 per ft. ea. day thereafter for 7 days, from 8th day thru the 14th day, 75¢ per ft. from the 15th and ea. day thereafter 50¢ per ft. Note: Charged U.S.C.G. 4 day boom rental from 1st billing.		
From 5/20/74		thru 6/3/74=15 days x $500.00 per day for 1000' of boom @ 50¢ per ft. =	$ 7500 00	$7500 00
	B.	Clean Water, Inc. Harbor Oil Containment Boom @$1.50 per ft 1st day @ .333 per ft. ea. day thereafter for 7 days, from the 8th day thru the 14th day @ .250 per ft. from the 15th day @ .167 per ft. ea. day thereafter.		
From 5/20/74		thru 6/3/74= 15 days x $233.10 per day for 1400 ft @ .167 per ft. =	$ 3496.50	$3496 50
	C.	Clean Water, Inc. Sorbent C petroleum absorbent material @ $ 3.95 per 18 lb. bag.		
Wed 5/22/74		12 bags @$ 3.95 ea. =	$ 47 40	
Thur 5/23/74		8 " " " =	$ 31 60	
Fir 5/24/74		20 " " " =	$ 79 00	
Sat 5/25/74		9 " " " =	$ 35 55	
Sun 5/26/74		10 " " " =	$ 39 50	
Mon 5/27 - 5/31= 35 bags @ $ 3.95 per bag =			$ 138 25	
Sat 6/1 thru 6/3/74= 16 bags @$ 3.95 ea. =			$ 63 20	
				$ 434 50
	D.	Clean Water, Inc. 900 cu. ft air compressor @ $12.00 per hr + diesel oil & transportation.		
Sun 5/26/74		2 hrs @$ 12.00 per hr =	$ 24 00	$ 24 00

INVOICE

(26)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

CBI ORIGINAL

CLEAN WATER — SEA HOSE — TO THE INDUSTRY

Customer's Order S.C. Weber, Mgr. Date June 7, 1974

SOLD TO
Arco Pipeline Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control Operation on behalf of M/T Elia & Owners, et-al. at Arco Dock
Ft. Mifflin, PA

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
			Page 2	Enclosure 3	3111-3-2

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
	F.	Clean Water, Inc. Har. Winch Stake @ $ 10.00 per hr + 10¢ per mile + tolls		
		Tolls May 1&2(Towing at times 9ton trailer=	$ 3 75	
Tue 5/28/74		7 hrs @ $ 10.00 per hr =	$ 70 00	
		144 miles @ 10¢ =	$ 14 40	
		Tolls =	$ 4 50	
Sat 5/18/74		144 miles @10¢ per mile =	$ 14 40	
		6 hrs @10.00 per hr =	$ 60 00	
		Tolls =	$ 4 50	
	G.	Clean Water, Inc. 3/4 ton GMC pickup truck @ $2.00 per hr + tolls + 10¢ per mile.		$171 55
5/20/74 thru 5/26/74= 7 days @ 12.00 @$2.00 per hr= $24.00 per day. =			$ 168 00	
5/27/74 thru 6/2/74= 7 days @$12.00 @$2.00 per hr+$24.00 per day =			$ 168 00	
6/3/74 Mon		72 miles @ 10¢ per mile =	$ 7 20	
		12 hrs @ $ 2.00 per hr =	$ 24 00	
		Tolls =	$ 1 20	$ 368 40
	H.	Clean Water, Inc. Workboats @$ 60.00 per day.		
5/20/74 Mon		2 Workboats- DAY RATE =	$ 120 00	
5/21/74 Tue		" " " " =	$ 120 00	
5/22/74 Wed		1 " " =	$ 60 00	
5/23/74 Thu		" " " " =	$ 60 00	
5/24/74 Fri		" " " " =	$ 60 00	
5/25/74 Sat		2 " " " =	$ 120 00	
5/26/74 Sun		" " " " =	$ 120 00	
5/27/74 thru 6/3/74=11 boats DAY RATE @ $60.00 ea. =			$ 660 00	$ 1320 00
	I.	Vanguard - Rental of Trailer =	$ 425 37	$ 425 37

INVOICE

(27)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
-24 HOURS

CBI ORIGINAL

CLEAN WATER TO THE INDUSTRY

Customer's Order S.C. Weber, Mgr. Date June 7, 1974

SOLD TO
Arco pipeline Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control Operation on behalf of M/T Eli & Owners, et-al At Arco Dock Ft. Mifflin, PA

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
			Page 3	Enclosure 3	3111-3-2

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
	Fl	(F-Con't - Winch Stake Truck)		
Sat 5/25/74		144 miles @ 10¢ per mile =	$ 14 40	
		6 hrs @$ 10.00 per hr =	$ 60 00	
		Tolls =	$ 5 25	$ 79 65
	J/	Motor Crane Service, Inc. for use of equip. =	$ 843975	$8439 75
	K.	Diesel Oil- 11-55 gal. drums= 605 gallons @ 42¢ a gallon (Washing of Boom) =	$ 254 00	$ 254 00
	K1	6-55 gallon drums of Mineral Spirits supplied from CWI stock @ 72.00 per drums (Washing of oil boom) =	$ 432 00	$ 432 00
	L.	Clean Water, Inc. Generator @$2.00 pr hr.		
Mon 5/20/74		5 hrs @$ 2.00 per hr =	$ 10 00	
From 5/21/74		thru 5/27= 7 days @8 hrs per day(16.00 per day) =	$ 112 00	
Wed 5/29/74		4 hrs @$ 2.00 per hr =	$ 8 00	
Sat 6/1/74		4 hrs @$ 2.00 per hr =	$ 8 00	$ 138 00
	M.	Materials supplied by Clean Water, Inc.		
		Hand crab nets= 17 @$ 3.75 ea. =	$ 63 75	$ 63 75
	O.	Clean Water, Inc. Filter Booms @$30.00 ea.		
Thu 5/30/74		1 Boom @$ 30.00 =	$ 30 00	
Fri 5/31/74		1 Boom @$30.00 =	$ 30 00	
Sat 6/1/74		1 Boom @$30.00 =	$ 30 00	$ 90 00
	P.	Clean Water, Inc. 40' salvage & pollution gear trailer @$ 75.00 per day + transp..		
5/17 thru 5/23		7 days- 6th week =	$ 75 00	
5/24 thru 5/30		7 days- 7th week =	$ 75 00	

INVOICE

(28)

CLEAN WATER, INCORPORATED

Toms River, New Jersey

CBI ORIGINAL

COURT HOUSE SQUARE
P. O. BOX 1002

08753

201 341-3600
24 HOURS

Customer's Order S.C. Weber, Mgr. Date June 7, 1974

SOLD TO
. Arco Pipeline Co.
P.O. Box 2086
Sinking Spring, PA 19608

SHIPPED TO
Oil Pollution Control Ope:
ation on behalf of M/T Eli:
& Owners, et-al at Arco Doc
Ft. Mifflin, PA.

DATE SHIPPED	SHIPPED VIA	TERMS	F.O.B.		OUR ORDER NUMBER
			Page 4	Enclosure 3	3111-3-2

QUANTITY ORDERED	QUANTITY SHIPPED	DESCRIPTION	UNIT PRICE	AMOUNT
	P	(con't)		
5/31 thru 6/3/74 - 4 days-8th week @$ 10.71 per day			= $ 42 84	$ 192 84
		Total Enclosure 3		$23430 31

INVOICE

ADDRESS REPLY TO
COMPTROLLER AND
REFER TO FILE NO.

CBI ORIGINAL

PHILADELPHIA NAVAL SHIPYARD
PHILADELPHIA, PA. 19112
COMPTROLLER DEPARTMENT

STATEMENT NO. 136-74

CASH ADVANCE ACCOUNT NO. 79-378

TO: Arco Pipeline Company
P.O. Box 7709
Phila., PA 19101

25 June 19 74

(MAKE CHECKS PAYABLE TO PHILADELPHIA NAVAL SHIPYARD, AND MAIL TO COMPTROLLER DEPARTMENT CODE 630, PHILADELPHIA NAVAL SHIPYARD, PHILADELPHIA, PA. 19112)

DESCRIPTION	ADVANCE	EXPENDITURES	Amount Due Shipyard
Total charges for clean-up of #4 Fuel Oil spill due to explosion of tanker, creating a fire hazard			2,109 35

RECEIVED
JUL 3 1974
LEGAL DEPT.

Payment approved
[signature]
AUG 20 1974

INDEXED AUG 27 1974

CASH ADVANCE ACCOUNT, NAVY INDUSTRIAL FUND, ACCOUNT 10

PLATE NO. 88859

4ND-SHPYD-727C/3(REV 3-66)

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CBI ORIGINAL

HAA675
R 112003Z APR 74
FM NAVSHIPYD PHILADELPHIA PA
TO ARCO PIPELINE COMPANY PO BOX 7709 PHILADELPHIA PA 19101
INFO CAPTAIN OF THE PORT US COAST GUARD BASE GLOUCESTER NJ
BT
UNCLAS //N09240//
CLEAN UP OF ARCO OIL SPILL
1. ON 11 APRIL 74 OIL WAS DISCOVERED ENTERING THE WATERFRONT AREAS OF THE PHILADELPHIA NAVAL SHIPYARD.
2. THE US COAST GUARD HAS DETERMINED FROM THEIR ON-SITE INSPECTION AND SAMPLES OF 11 APRIL 74 THAT THE OIL CAME FROM THE GREEK TANKER THAT EXPLODED AT YOUR FACILITY. THE OIL WAS RELEASED FROM THE CONTAINMENT BOOM WHEN A FIRE BOAT RAN OVER THE BOOM.
3. THE US COAST GUARD (ACTING AS YOUR POLLUTION ADVISORS) AUTHORIZED THE PHILADELPHIA NAVAL SHIPYARD TO CLEAN UP THE SPILL AND BILL YOUR COMPANY.
4. IT IS REQUESTED THAT AN ADVANCE OF $5,000. BE FORWARDED TO THE PHILADELPHIA NAVAL SHIPYARD TO COVER CLEAN-UP EXPENDITURES. ANY EXCESS OF PAYMENT WILL BE PROMPTLY RETURNED TO ARCO.
BT
#1813

ORIGINAL

Date: August 15, 1974

To: Mr. H. J. Russell, AP-4171

From: David E. Rosenbaum, CS-2112K

Subject: Proposed Letter to Lidoriki Maritime Corp.
Oil Pollution Cleanup Costs
LD 38-2-126

Pursuant to your letter of August 13, 1974 addressed to Joe Doti in New York, Bill Larsen and I have discussed your proposed letter to Lidoriki Maritime Corp. demanding reimbursement of oil pollution cleanup expenses. We suggest the following changes.

A new sentence should be added to the beginning of the first paragraph, reading, "This letter is written on behalf of Atlantic Richfield Company and ARCO Pipe Line Company, its wholly-owned subsidiary."

The amount expended should be $245,768.81 instead of $245,899.40. (This includes bills from Clean Water, Inc. of $152,889.01 and $40,507.98; from Coastal Services of $50,162.47; and from the Philadelphia Naval Shipyard of $2,109.35.) The last sentence of the first paragraph should read, "As a result of this incident, funds in the amount of $245,768.81 have been expended as cleanup costs." In the second paragraph, second sentence, we suggest that you refer to "prompt oil pollution removal action..." and in the fourth paragraph, second sentence, on Page 2, we suggest that you refer to "necessary" action instead of "prompt remedial" action. I am enclosing herewith a copy of the Naval Shipyard bill and the April 11 telegram. I suggest that you send the telegram attached to the bill in order to make the point that ARCO Pipe Line Company was under mandate from the Coast Guard in this matter.

David E. Rosenbaum

DER:ks
Enclosures

cc: Mr. R. F. Thompson, Independence, Kansas ✓
Mr. William P. Larsen, New York City

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To: Mr. K. A. Baden

From: S. C. Weber S.C.W.

Subject: Credit from Clean Water, Inc.

Date: September 9, 1974

ORIGINAL

Attached is a check from Clean Water, Inc. in the amount of $2788.35, adjusting an overcharge on their invoice dated June 7, 1974 for oil pickup at Fort Mifflin.

Copy: Mr. M. H. Leinbach

SCW:dh

U.D.74

Accounts Receivable - Trade $2788.35
Clean Water Inc.
Y352 9-12-74

Copy to CTC
RBH
RFT
HTW
& copy of Clean Water letter
9/11/74

01-222

PLEASE CONFINE EACH LETTER TO ONE SUBJECT

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CLEAN WATER, INCORPORATED

S. C. WEBER

Toms River, New Jersey

P. O. BOX 1002
COURT HOUSE SQUARE

'08753

201 341.3600
24 HOURS

ORIGINAL

[illegible]

[illegible]
[illegible]
[illegible]

Attn: [illegible]

Re: [illegible]
[illegible]
[illegible]

[illegible]:

Clean Water, Inc. was able to obtain a reduction on the daily rate for the Hydynamic 74½ ton Cherry Picker with 48' of boom, thus instead of the rate of $232.50 per day, it was reduced to $136.35 per day.

Enclosed is our check #5070 covering the amount of money due as a credit, in the amount of $2,788.35. This refers to Clean Water, Inc. invoice #3111-3-2 dated June 7, 1974, enclosure III-J, Motor Crane Service, Inc.

This covers a period of twenty-nine days from May 1st through May 5th and from May 8th through May 31, 1974, thus a saving of $96.15 per day or a total of $2,788.35 for the 29 days.

Sincerely yours,

CLEAN WATER, INC.

[signature]

[illegible]
President

[illegible]
[illegible]

CLEAN WATER

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Item No.	P.D.No.	Date	Typist	Item No.	P.D.No.	Date	Typist